Biological Evaluation

For Forest Service Sensitive Plant Species

SERAL

Project Location:
Tuolumne County, California

Mi-Wok Ranger District
Stanislaus National Forest

November 2021

Prepared by:

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This biological evaluation has been prepared in accordance with direction in FSM 2672.4. It is in compliance with 36 CFR 219.19 and 36 CFR 241.1.

Contents

Introduction

The purpose of this biological evaluation is to determine whether implementation of the SERAL project would result in a trend toward Federal listing of any Sensitive Plant species.

A Sensitive Plant is defined as a plant species "identified by a Regional Forester for which population viability is a concern, as evidenced by: "a. Significant current or predicted downward trends in population numbers or density." and "b. Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution." (FSM 2670.5 (19)).

The primary purpose of The Social and Ecological Resilience Across the Landscape (SERAL) project is a planning effort designed to restore forest resilience and the landscape's ability to persist with fire as a natural process on the Stanislaus National Forest.

Surveys for Sensitive Plants have not been completed in the analysis area. The information used in the analysis is from previous or ongoing projects within portions of the project area. Surveys for the appropriate Sensitive Plants will occur prior to any implementation.

Consultation to Date

A list of all Federally listed Threatened, Endangered or Proposed plant species which might occur on the Stanislaus National Forest was acquired from the U.S. Fish and Wildlife Service (USFWS, 2021). As indicated by the latest list, dated September 7, 2021, there are no occurrences of Federally listed plant species in the Stanislaus National Forest. Whitebark pine (*Pinus albicaulis*) is proposed for threatened status under the Endangered Species Act, however the project area is expected to be below the minimum elevation of the species on the Forest.

Current Management Direction

Management of Sensitive Plants on the Stanislaus National Forest is based on Forest Service policy set out in the Forest Service Manual (FSM 2670) and the Forest Service Handbook (FSH 2609.26), the Stanislaus National Forest "Forest Plan Direction," which presents the current Forest Plan management direction, based on the original Forest Plan as modified through the Forest Plan appeals and amendment processes (USDA 2005?), and where applicable, Species Management Guides.

It is the Secretary of Agriculture's policy to "avoid actions 'which may cause a species to become threatened or endangered.'" (FSM 2670.12). Further, it is a Forest Service objective to "maintain viable populations of all native ... plant species in habitats distributed throughout their geographic range on National Forest System lands" (FSM 2670.22). Forest Service policy set out in FSM 2670.32 is to "avoid or minimize impacts to [Sensitive] species whose viability has been identified as a concern." Further, where it is determined that impacts cannot be avoided, "the line officer with project approval authority, [may make] the decision to allow or disallow impact, but the decision must not result in loss of species viability or create significant trends toward Federal listing." Under the Sierra Nevada Forest Plan Amendment (SNFPA), "conduct field surveys for threatened, endangered, proposed, and sensitive (TEPS) plant species early enough in the project planning process so that the project can be designed to

conserve or enhance TEPS plants and their habitat. … If additional field surveys are conducted as part of project implementation, document the survey results in the project file (USDA Forest Service 2010)."

General direction for management of Sensitive Plants under the LRMP is to "provide for protection and habitat needs of sensitive plants, so that Forest activities will not jeopardize their continued existence." LRMP standards and guidelines advise to "modify planned projects to avoid or minimize adverse impacts to sensitive plants."

In 2005, a conservation assessment for *Cypripedium montanum* (Kaye and Cramer) was completed. The assessment includes a population trends and viability analysis plus recommendations for conservation actions for this species.

In 2010, a conservation assessment was completed for *Peltigera gowardii*, which was known at the time as *Peltigera hydrothyria*, and previously as *Hydrothyria venosa* (Peterson). This conservation assessment discusses habitat requirements and threats and offers management considerations.

The interim management guide for *Erythronium tuolumnense* (Haas and Burnett 1990) states "*Erythronium tuolumnense* shall be protected from logging activities which would have a negative impact. If, through a Biological Evaluation, and in consultation with the Forest Sensitive Plant Coordinator, it is determined that limited logging can take place within a population area, appropriate prescriptions (as outlined in this management plan) will be followed." There are no other species management guides for the species treated in this analysis.

There is a draft conservation assessment for *Botrychiums* (Farrar 2009). It has no management recommendations.

Project Description - Proposed Action

Refer to the SERAL Draft EIS for in depth discussion on the alternatives, including those not analyzed in detail.

Alternative 1 (modified – Proposed Action), as described in the Notice of Intent (Federal Register Vol. 85, No. 137, Thursday, July 16, 2020 p. 43205-43206) with modifications made in response to public comment and collaborative feedback. Alternative 1 – the modified proposed action, was developed to meet the purpose and needs of the project in collaboration with Yosemite Stanislaus Solution collaborative group. Actions proposed in Alternative 1 include, the construction and maintenance of fuelbreaks, prescribed fire, understory and surface fuel reduction, forest thinning, and non-native invasive weed control and eradication treatments. The proposed actions included in this alternative were crafted to adopt the management approaches and conservation measures presented in the 2019 Conservation Strategy for the California Spotted Owl in the Sierra Nevada, including a suite of project-specific forest plan amendments to align the Stanislaus National Forest Land and Resource Management Plan with the direction of the CSO Strategy. For Alternative 1 details, see the SERAL DEIS incorporated here by reference.

Alternative 2 (No Action) is the "no action" alternative. Under this Alternative, no actions would occur.

Alternative 3 represents a version of the modified proposed action developed in compliance with current management direction as written in the Stanislaus National Forest Land and Resource Management Plan. Alternative 3 does not include any project-specific forest plan amendments or adopt the management approaches or conservations measures presented in the CSO Strategy. For Alternative 3 details, see the SERAL DEIS incorporated here by reference.

Alternative 4 represents an alternative which was developed to comprehensively address comments and concerns as well as incorporate suggestions received during the scoping period. Like Alternative 3, Alternative 4 has been developed under the direction of the current Stanislaus National Forest Land and Resource Management Plan, does not adopt the CSO Strategy or include a forest plan amendment. Unlike the other action alternatives, however, Alternative 4 does not include the salvage of drought, insect, disease, or fire killed trees, temporary road construction, or herbicide use for the control and eradication of non-native invasive weeds. For Alternative 4 details, see the SERAL DEIS incorporated here by reference.

The following are project specific management requirements pertaining to sensitive plants.:

Management Requirements (Sensitive Plants)

1. Prior to implementing activities, complete appropriate sensitive plant surveys based on current Regional direction.

2. Forest Service botanist will identify necessary protective measures based on sensitive plant surveys prior to implementation to ensure viable populations remain intact. Avoidance areas, limited operating periods (LOPs)Ps, or other appropriate measures will be mapped and administered during implementation. R5 Sensitive and local concern plant species will be subject to treatment buffers (typically 10 feet), in which heavy equipment will be prohibited and other treatment activities may be limited, unless otherwise agreed upon by the botanist and deciding official. Specific buffer distances will depend on plant and habitat characteristics and will be determined at time of discovery.

3. Minimize impacts to known sensitive plant populations through prescribed fire planning. For planned spring (growing season) ignitions, the following must be met; planned fire can only be introduced to 20% of the known plant populations within the project area in any one year, and those same populations must not be burned in consecutive years. Avoid direct ignition in sensitive plant populations, but fire is allowed to back into populations. Some populations may require exclusion.

4. Avoid vehicle use, parking, and fireline construction over volcanic openings that have limited vegetation (e.g., less than 50% vegetation) to protect existing sensitive plants and to discourage the invasion of non-native plants (e.g., cheatgrass) which can establish in a continuous pattern, and behave as a flashy fuel.

5. Do not place burn piles in volcanic (lava caps) or granitic openings and outcrops.

6. White bark pine (*Pinus albicaulis)*, if found, will be protected from harm and effects during implementation.

Existing Environment

The SERAL action area occurs at elevations ranging from 1,064 feet to 7,863 feet. This landscape is comprised of vegetative communities including grassland, meadows, oak woodlands, chaparral, lower westside ponderosa pine, mixed conifer and high elevation red fir and lodgepole pine. The majority of forested area is Sierran Mixed Conifer, which includes ponderosa pine / Jeffrey pine, incense cedar, white fir, sugar pine, and black oak. Plantations are also present throughout the project area and consist mainly of ponderosa pine. Other tree species found include live oak, blue oak, aspen, cottonwood, alder, and Douglas fir. Shrub species present include green leaf and white leaf manzanita, deer brush, chinquapin, mountain whitethorn, buck brush, gooseberry, toyon, birch leaf mountain mahogany, and chamise in lower parts of the river canyon.

Project area soils follow the geology patterns, with old, deeply weathered clay soils derived from metamorphic rock in the lower elevations and granitic rock at mid elevations. Thin or poorly developed soils exist on volcanic ridges, and granitic canyon walls, while and deep, coarse textured soils occur at the higher, glaciated elevations.

Dominant habitat types are often described by using the CWHR model (Mayer and Laundenslayer 1988).

Habitat Type	Acres
Hardwood	21,421
Herbaceous	1,104
Mixed conifer/fir	6,753
Mixed conifer/pine	67,079
Nonveg	279
Pine dominated	5,951
Shrub	15,321
Other	900
Total	118,808

The total analysis area boundary encompasses 118,808 acres (Table). Unless otherwise specified, the area used to analyze the direct and indirect effects on sensitive plants and habitat is about 94,823 acres of Stanislaus National Forest System lands within the project boundary. An additional 23,984 acres are not National Forest lands. The analysis area is based on 1) the area of impact to forest vegetation from proposed project activities as the project boundary. This analysis is bounded in time for short-term effects (up to 20 years) and long-term effects (up to 50 years).

The project area is 1) severely departed from Natural Range of Variation (NRV) and 2) extremely vulnerable to large high-severity --wildfire that threatens mature forest habitat and human communities. Departure from NRV is shown in detail by GIS products and models and in the SERAL DEIS.

There are numerous occurrences of non-native invasive weeds in the SERAL project area. It is suspected there are more occurrences than currently recorded. Existing populations of some species have likely increased in size since their discovery and there is a possibility of other invasive species not yet discovered. Refer to the SERAL Draft EIS of a complete list of known invasive plants and the approximate number of acres where they are present. In some cases the invasive plants are present within sensitive

plant populations. The presence of invasive plants on the landscape and within sensitive plant populations can threaten the health and vigor of native and sensitive vegetation through competition for available resources and changes in natural processes across the landscape.

Sensitive Plant Review

There are 50 species on the Regional Foresters Sensitive Plant list that occur or may occur on the Stanislaus National Forest. Nine of the species are outside the elevation and/or geographic range of SERAL. Eight species have documented occurrences in the project area.

Based on habitat, range of species and elevation, 40 sensitive plant species are known or have the possibly of occurring within the SERAL project area. A few of them are unlikely but remain possible. There are also four known species from the Forest Watchlist and Botanical Special Interest. Other watchlist and special interest species could be present.

This includes white bark pine (*Pinus albicaulis*), currently an ESA proposed species. The project is on the edge of the elevation range for the species. Based on known occurrences and assumption we would avoid any negative effects on the species if found.

The following ten species are outside the elevation and/or geographic range of the project area and will not be analyzed further in this document. A no effect determination will be recorded. *Allium yosemitense*, *Boechera evadens*, *Clarkia lingulata*, *Draba asterophora* var. *asterophora*, *Draba asterophora* var. *macrocarpa*, *Eriophyllum congdonii*, *Eriophyllum nubigenum*, *Erythronium taylorii*, *Lewisia congdonii*, and *Mimulus filicaulis*.

The following 40 species are known to occur or have the possibility of occurring within the SERAL project area. *Allium jepsonii*, *Allium tribracteatum*, *Arctostaphylos nissenana*, *Balsamorhiza macrolepi*s, *Boechera tularensis, Botrychium ascendens*, *Botrychium crenulatum*, Botrychium lineare, *Botrychium lunaria*, *Botrychium minganense*, *Botrychium montanum*, *Botrychium pedunculosum*, *Botrychium pinnatum*, *Botrychium tunux*, *Botrychium yaaxudakeit*, *Bruchia bolanderi*, *Calochortus clavatus*, *Cinna bolanderi, Clarkia australis*, *Clarkia biloba ssp. australis*, *Cypripedium montanum*, *Collybia racemosa*, *Eriastrum tracyi, Eriogonum luteolum var. saltuarium*, *Erythronium tuolumnense*, *Fissidens aphelotaxifolius*, *Helodium blandowii*, *Horkelia parryi*, *Hulsea brevifolia*, *Iris hartwegii ssp. columbiana*, *Lewisia kelloggii ssp. hutchinsonii*, *Lewisia kelloggii ssp. kelloggii*, *Lomatium stebbinsii*, *Meesia uliginosa*, *Mielichhoferia elongata*, *Mielichhoferia shevockii*, *Mimulus pulchellus*, *Peltigera gowardii*, *Pinus albicaulis* and *Tauschia howellii.*

Previous surveys and projects in the SERAL project area have documented occurrences of *Allium tribracteatum*, *Clarkia biloba ssp. australis*, *Cypripedium montanum*, *Erythronium tuolumnense*, *Horkelia parryi*, *Iris hartwegii ssp. columbiana*, *Lomatium stebbinsii*, and *Mimulus pulchellus*.

Table 1 lists all the Forest Service sensitive species known or expected to occur on the STF. The columns indicate general habitat and range for each species, if the species is documented in the project area and finally indicate if a species is included for further analysis. More complete descriptions of the species and status related to the SERAL project is under Species and Habitat Accounts below.

Table 1 - STF Sensitive Plants

Scientific Name (Common name)	Elevation Range	**Known** or Suspected Ranger Districts, Habitat Type, Geographic Range	Documented Occurrence in Project	Include in analysis
*Allium jepsonii** (Jepson's onion)	900-6000’	Calaveras, Mi-Wok. Basalt or serpentine outcrops, locally on the Mehrten Formation (Table Mtn. latite) north to Plumas N.F.	No	Yes
Allium tribracteatum (three bracted onion)	3,000-6,500'	**Mi-Wok, Calaveras,** Summit. Volcanic ridges between Stanislaus & Mokelumne Rivers	Yes	Yes
Allium yosemitense (Yosemite onion)	1,500 - 7,000'	**Groveland.** Metamorphic rock ridges, south of Tuolumne River.	No	No
*Arctostaphylos nissenana** (Nissenan manzanita)	1,450 - 3,650’	Calaveras, Groveland, Mi-Wok. Ancient tropical soils, often with slate or shale, usually with low to moderately low pH. Similar to HOPA sites.	No	Yes
*Balsamorhiza macrolepi*s (big-scale balsamroot)	0 - 5,000’	**Groveland, Mi-Wok**, Calaveras. Openings in mixed chaparral or yellow pine forest. Possible in open Sierran mixed conifer.	No	Yes
Boechera evadens (hidden rockcress)	8,000 - 11,000’	**Calaveras,** Mi-Wok, Summit. Alpine or subalpine species in rock outcrops, rock domes, crevices, talus, or scree sites; limestone, marble, granite, metamorphic, volcanic substrates.	No	No
*Boechera tularensis** (Tulare rockcress)	6,000 – 11,000’	All districts. Upper montane to sub-alpine forest (red fir, Jeffrey pine, lodgepole), usually east-facing aspect, shaded or partially shaded.	No	Yes
Botrychium ascendens (upswept moonwort)	4,800 - 11,000’	**Summit**, Calaveras, Mi-Wok, Groveland. Calcareous or andesitic mineral influenced openings of wet meadows, fens, seeps, or riparian areas.	No	Yes
Botrychium crenulatum (scalloped moonwort)	4,800 - 11,000’	**Calaveras, Groveland, Summit,** Mi-Wok. Calcareous or andesitic mineral influenced moist to saturated soils in meadows, seeps, springs, riparian areas.	No	Yes
Botrychium lineare (slender moonwort)	4,800 - 12,000’	**Summit**, Calaveras, Mi-Wok, Groveland. Moist habitat margins incl. meadows, seeps, springs, riparian areas where roots can reach mineral soil; usually calcareous, usually with perennial herbaceous spp. Seldom under dense tree canopy. Assoc. with Cupressaceae spp. (e.g. *Calocedrus decurrens*).	No	Yes
Botrychium lunaria (common moonwort)	6,200 – 12,000'	**Calaveras**, Mi-Wok, Summit, Groveland. Moist, well-drained soils; meadows, streamsides, seeps & springs, sparsely vegetated scree slopes; deep woods or open areas.	No	Yes
Botrychium minganense (Mingan moonwort)	4,800 - 11,500’	**Calaveras, Groveland, Summit,** Mi-Wok. Variable habitats: dense shade to open sun, dry to saturated; riparian areas, small streams, meadows, fens, conifer forest. Calcareous, andesitic or basaltic soils influenced.	No	Yes

Scientific Name (Common name)	Elevation Range	**Known** or Suspected Ranger Districts, Habitat Type, Geographic Range	Documented Occurrence in Project	Include in analysis
Botrychium montanum (western goblin)	4,800 – 8,000'	**Calaveras**, Mi-Wok, Summit, Groveland. Moist to saturated soils high in organic matter. Meadows, fens, seeps and streamsides in mixed conifer forests. Open sun or dense shade. *Calocedrus decurrens* associate. Andesitic influenced.	No	Yes
Botrychium pedunculosum (stalked moonwort)	4,800 - 7,000'	**Groveland,** Calaveras, Mi-Wok, Summit. Moist habitats incl. meadows, seeps, springs, riparian areas. *Calocedrus decurrens* associate. Open to closed canopy. Andesitic influenced.	No	Yes
Botrychium pinnatum (northwestern moonwort)	4,800 - 9,500'	**Summit,** Calaveras, Mi-Wok, Groveland. Moist grassy sites, shrubby slopes; open or closed canopy; meadows, streamsides; Calcareous or andesitic mineral influenced.	No	Yes
*Botrychium tunux** (moosewort)	6,000 - 9,500'	Summit, Calaveras. Well drained, rocky meadows. Sparsely vegetated gravelly substrates; rocky stream terraces. Calcareous influenced.	No	Yes
*Botrychium yaaxudakei*t* (giant moonwort)	6,900 – 12,000'	Summit, Calaveras. Moist alpine meadows. In YNP, under shrubby vegetation (e.g. *Dasiphora fruticosa* and *Salix* spp.) among calcareous talus boulders. In AK & ID, in grassy riverine meadows and mountain talus slopes.	No	Yes
Bruchia bolanderi (Bolander's bruchia)	5,000 - 9,000'	**Mi-Wok, Summit,** Calaveras, Groveland. Damp, vertical soil surfaces; meadows, streams, upturned tree roots. Sporophytes appear in September.	No	Yes
Calochortus clavatus (Pleasant Valley mariposa lily)	2,800 - 6,000'	**Calaveras**. Openings in mixed-conifer and ponderosa pine forests, southerly aspects. Rocky soils with surface rocks and cobbles readily apparent.	No	Yes
*Cinna bolanderi** (Bolander's woodreed)	6,000 – 7,900'	Groveland, Mi-Wok, Summit. Stream banks, wet meadows, moist sites in conifer forest. Nearest location is in Yosemite 1.5 miles east of Forest boundary.	No	Yes
Clarkia australis (Small's southern clarkia)	3,000 - 5,000'	**Groveland, Mi-Wok.** Openings in ponderosa pine/bear clover, oak/manzanita. Usually south, SE or SW aspects.	No	Yes
Clarkia biloba ssp. australis (Mariposa clarkia)	1,500 - 4,600'	**Groveland**, **Mi-Wok**. Mostly open sites in chaparral, ponderosa pine, oak habitats from Table Mtn. south to city of Mariposa, esp. Merced River Canyon.	Yes	Yes
*Clarkia lingulata** (Merced clarkia)	1,500 - 4,000'	Groveland. North-facing slopes in open chaparral; Merced River canyon.	No	No
Cypripedium montanum (mountain ladyslipper)	3,500 - 6,500'	**Calaveras, Groveland, Mi-Wok**, Summit. Deep, loamy soils with heavy duff layer, under dense canopy, Douglas-fir, fir/pine. Little or no recent disturbance in microsite.	Yes	Yes

Scientific Name (Common name)	Elevation Range	**Known** or Suspected Ranger Districts, Habitat Type, Geographic Range	Documented Occurrence in Project	Include in analysis
Collybia racemosa (branched collybia; syn *Dendrocollybia racemosa*)	2,500 – 7,000'	**Mi-Wok,** Calaveras, Groveland, Summit? Grows on the decayed remains of decaying mushrooms, or in duff of mixed hardwood-conifer woods; fruiting from late fall to mid-winter.	No	Yes
*Draba asterophora var. asterophora** (Tahoe draba)	8,500 - 11,000'	Calaveras, Summit. Usually on granitic scree slopes, some on volcanic. One historic site is on metamorphic rock substrate.	No	No
*Draba asterophora var. macrocarpa** (Cup Lake draba)	8,500 - 11,000'	Calaveras, Summit. Rock crevices, alpine barrens, talus.	No	No
*Eriastrum tracyi** (Tracy's Eriastrum)	1,035 - 5,400'	All districts. Chaparral, cismontane woodland; gravelly shale above compacted clay soil, gravelly loam, coarse granitic sand, stony clay loam, or adobe	No	Yes
Eriogonum luteolum var. saltuarium (Jack's buckwheat)	5,500 - 8,000'	**Summit,** Calaveras, Mi-Wok, Groveland. Sandy granitic flats and slopes, sagebrush communities, montane conifer woodlands.	No	Yes
Eriophyllum congdonii (Congdon's woolly sunflower)	1,600 - 5,100'	**Groveland.** Metamorphic rock ridges, south of Tuolumne River, east of Pilot Ridge.	No	No
Eriophyllum nubigenum (Yosemite woolly sunflower)	4,000 - 8,000'	**Groveland.** Metamorphic or granitic rock outcrops, Pilot Ridge to Yosemite.	No	No
Erythronium taylorii (Taylor's fawn lily)	3,000 - 6,000'	**Groveland**. North-facing canyons, cliffs, riparian areas. Might be restricted to low pH substrates.	No	No
Erythronium tuolumnense (Tuolumne fawn lily)	1,200 - 5,000'	**Mi-Wok**, Calaveras, Groveland. North-facing canyons, riparian areas, rocky areas with subsurface water flow, Stanislaus River, N.Fork Tuolumne River & its tributaries, Main Tuolumne River.	Yes	Yes
*Fissidens aphelotaxifolius** (brook pocket moss)	0 - 6,300'	All districts. On wet soil, humus and rocks along narrow streams in the vicinity of small waterfalls; damp or wet crevices of cliffs. Not expected where scouring occurs.	No	Yes
Helodium blandowii (Blandow's bog moss)	6,500 - 9,000'	**Summit,** Calaveras, Groveland, Mi-Wok. Wet meadows, fens & seeps in subalpine conifer forest and alpine lake edges.	No	Yes
Horkelia parryi (Parry's horkelia)	0 - 3,500'	**Groveland, Mi-Wok,** Calaveras**.** Soils with low pH: including Josephine- Dystric Lithic assoc. (Map unit #157 & 103) & Josephine-Sites families complex (Map unit #161).	Yes	Yes
*Hulsea brevifolia** (short-leaved hulsea)	4,900 - 8,500'	Groveland. Part shade in red fir forest, upper montane forest, on sandy or gravelly soils. (Tuolumne & Merced Groves of Big Trees, YNP)	No	Yes?

Scientific Name (Common name)	Elevation Range	**Known** or Suspected Ranger Districts, Habitat Type, Geographic Range	Documented Occurrence in Project	Include in analysis
Iris hartwegii ssp. columbiana (Tuolumne iris)	1,350 - 4,600’	**Mi-Wok.** Open or partly shaded yellow pine forest, foothill woodland.	Yes	Yes
Lewisia congdonii (Congdon's bitterroot)	1,600 - 7,000'	**Groveland.** Metamorphic rock ridges, cliffs, south of Tuolumne River.	No	No
Lewisia kelloggii ssp. hutchinsonii (Hutchison’s lewisia)	4,800 - 7,000’	**Mi-Wok**, **Calaveras,** Groveland, Summit. Ridge tops or open flats with sandy granitic soils or on volcanic lava caps.	No	Yes
Lewisia kelloggii ssp. kelloggii (Kellogg’s lewisia)	5,000 - 11,000	**Calaveras,** Mi-Wok, Summit, Groveland. Open gravelly or sandy flats in mixed conifer and subalpine forest.	No	Yes
Lomatium stebbinsii (Stebbins’ lomatium)	3,500 - 7,500'	**Mi-Wok, Summit**, **Calaveras**. Volcanic lava caps between Mokelumne & Tuolumne Rivers.	Yes	Yes
*Meesia uliginosa** (broad-nerved hump-moss)	7,000 - 9,500'	All districts. Meadows, fens, on dead/decomposing wood, usually in the subalpine zone.	No	Yes
Mielichhoferia elongata (elongate copper-moss)	0 - 3,550’	**Groveland**, Mi-Wok, Calaveras. All types of rock outcrops, often with high copper or heavy metal content, which are seasonally or perennially moist, sometimes on moist soil. Foothill woodland with oak or chaparral, occ. conifers.	No	Yes
*Mielichhoferia shevockii** (Shevock’s copper-moss)	1,500 - 5,000’	Groveland, Mi-Wok, Calaveras. Same habitats and rock substrate as *M. elongata* (growing sympatrically in Merced Canyon). Likely in Tuolumne River Canyon.	No	Yes
Mimulus filicaulis (Hetch-Hetchy monkeyflower)	2,000 - 5,500'	**Groveland**. Meadows and seeps or damp to wet places that dry out in summer. South of Tuolumne River.	No	No
Mimulus pulchellus (pansy monkeyflower)	2,500 - 5,500'	**Calaveras, Groveland, Mi-Wok**, Summit. Meadows, seeps, vernally wet sites. Often on volcanic “lava caps.” Usually on gentle slopes.	Yes	Yes
Peltigera gowardii (Goward’s waterfan; syn *Hydrothyria venosa, P. hydrothyria*)	2,700 - 13,000'	**Calaveras, Groveland, Mi-Wok,** Summit. Shallow, perennial streams fed by cold water springs.	No	Yes
Pinus albicaulis ** (white bark pine)	7,000 - 12,100’	**Calaveras, Summit.** Subalpine habitats usually in open, sunny to moderately shaded sites, on weakly developed (immature) soils	No	Yes
Tauschia howellii (Howell’s Tauschia)	5,575 - 8,200’	All districts. Openings in subalpine and upper montane coniferous forest with red fir or mountain hemlock. Ridge tops and upper slopes, in granitic gravel (gruss), DG, metamorphic cobble	No	Yes

*No occurrences on STF. ** ESA – Proposed Federally Threatened.

Current project surveys

Project surveys have begun and will continue, ensuring that treatment areas will be surveyed prior to planned activities where treatments have potential to negatively affect sensitive plants depending on timing and treatment type. Existing known sensitive plant occurrence information has been incorporated into this analysis.

Past Surveys

Past Surveys have occurred over portions of the project area from previous project planning efforts. The Regional Foresters Sensitive Plant list was updated in 2013. Projects and surveys that occurred prior to the updated list would not have included all currently considered sensitive plant species. Most plant surveys that have occurred in the planning area are from prior to 2012 and may not reflect the current conditions.

Species and Habitat Accounts

Table 2 displays the State and Federal statuses, global and State rarity rankings, and the California Rare Plant Ranks. These rankings, availability of habitat, and local threats were considered in determining the inclusion of these species in the Regional Foresters Sensitive list.

Table 2: Status of the Sensitive Plants which occur or may occur in this project.

Sensitive Plant Species	Federal Status	State Status	Global/State Rankings[1]	CRPR List[2] with Threat Code Ext.[3]
Allium jepsonii	None	Rare	G2/S2	1B.2
Allium tribracteatum	None	None	G2/S2	1B.2
Arctostaphylos nissenana	None	None	G1/S1	1B.2
Balsamorhiza macrolepis	None	None	G2/S2	1B.2
Boechera tularensis	None	None	G3/S3	1B.3
Botrychium ascendens	None	None	G3/S2	2B.3
Botrychium crenulatum	None	None	G3/S2	2B.2
Botrychium lineare	None	None	G2G3/S1	1B.3
Botrychium lunaria	None	None	G5/S2?	2B.3
Botrychium minganense	None	None	G4G5/S2	2B.2
Botrychium montanum	None	None	G3/S2	2B.1
Botrychium pedunculosum	None	None	G2G3/S1	2B.1
Botrychium pinnatum	None	None	G4?/S2	2B.3
Botrychium tunux	None	None	G3/S1	2B.1
*Botrychium yaaxudakei*t	None	None	G3G4/S1	2B.1
Bruchia bolanderi	None	None	G3/S3?	4.2
Calochortus clavatus	None	None	G4T2/S2	1B.2
Cinna bolanderi	None	None	G2S2	1B.2
Clarkia australis	None	None	G2/S2	1B.2
Clarkia biloba ssp. *australis*	None	None	G4G5T2T3 /S2S3	1B.2
Cypripedium montanum	None	None	G4/S4.2	4.2

Sensitive Plant Species	Federal Status	State Status	Global/State Rankings[1]	CRPR List[2] with Threat Code Ext.[3]
Dendrocollybia racemosa	None	None	G2G3[4]	Not Tracked
Eriastrum tracyi	None	Rare	G3Q/S3	3.2
Eriogonum luteolum var. *saltuarium*	None	None	G5T1/S1	1B.2
Erythronium tuolumnense	None	None	G2/S2	1B.2
Fissidens aphelotaxifolius	None	None	G3G4/S1	2B.2
Helodium blandowii	None	None	G5/S1	2B.3
Horkelia parryi	None	None	G2/S2	1B.2
Hulsea brevifolia	None	None	G3/S3	1B.2
Iris hartwegii ssp. columbiana	None	None	G4T1/S1	1B.2
Lewisia kelloggii ssp. *hutchisonii*	None	None	G3G4T2T3Q /S2S3	3.2
Lewisia kelloggii ssp. *kelloggii*	None	None	G3G4T2T3Q /S2S3	3.2
Lomatium stebbinsii	None	None	G2/S2	1B.1
Meesia uliginosa	None	None	G4/S3	2B.2
Mielichhoferia elongata	None	None	G4/S2	2B.2
Mielichhoferia shevockii	None	None	G1/S1	1B.2
Mimulus pulchellus	None	None	G2G3/S2S3	1B.2
Peltigera gowardii	None	None	G3G4/S3	4.2
Pinus albicaulis	Threatened	None	Not Tracked	Not Tracked
Tauschia howellii	None	None	G2/S2	1B.3

[1]Global/State Ranking: Global ranking " is a reflection of the overall status of [a species] throughout its global range. " State ranking "is assigned much the same way as global rank, but state ranks refer to the imperilment status only within California's state boundaries." Both the global and state ranks reflect the "combination of Rarity, Threat and Trend factors, with weighting being heavier on Rarity than the other two" (CNDDB 2021). The following ranking system definitions are taken from CNDDB 2021:

Global Ranking

G1 = Critically Imperiled—At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.

G2 = Imperiled—At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.

G3 = Vulnerable—At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.

G4 = Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.

G5 = Secure—Common; widespread and abundant.

Subspecies are given a T-rank with the G-rank which "reflects the global situation of just the subspecies or variety" (CNDDB 2021). "Q" with the ranking indicates that there are taxonomic questions.

State Ranking

S1 = Critically Imperiled—Critically imperiled in the state because of extreme rarity (often 5 or fewer populations) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state.

S2 = Imperiled—Imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the state.

S3 = Vulnerable—Vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation from the state.
S4 = Apparently Secure—Uncommon but not rare in the state; some cause for long-term concern due to declines or other factors.
S5 = Secure—Common, widespread, and abundant in the state.

The ranking of some species is expressed as a range (e.g. S2S3). This means that the rank is somewhere between S2 and S3. Sometimes a question mark (S2?) is used to represent "more certainty than S2S3, but less certainty than S2" (CNDDB 2021).

[2]California Rare Plant Ranks (CRPR) and their definitions (CNDDB 2021):
1A. Presumed extirpated in California and either rare or extinct elsewhere
1B. Rare or Endangered in California and elsewhere
2A. Presumed extirpated in California, but more common elsewhere
2B. Rare or Endangered in California, but more common elsewhere
3. Plants for which we need more information - Review list
4. Plants of limited distribution - Watch list

[3]Threat Code Extensions:
.1 - Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)
.2 – Moderately threatened in California (20-80% of occurrences threatened / moderate degree and immediacy of threat)
.3 – Not very threatened in California (<20% of occurrences threatened / low degree and immediacy of threat or no current threats known)

[4]Source: Oregon Biodiversity Information Center (ORBIC 2013) and NatureServe (2014). This species is not ranked in California.

Suitable habitat for any species can be defined as the surroundings, substrate and environmental factors which allow that species to successfully grow and reproduce. Rarity in plants can be the result of several things. Loss of habitat is a key factor for some species. Reproductive isolation through loss of populations is another factor. In many cases, the scarcity of the habitat in which the species evolved is the limiting factor which makes the species rare. Many of the rare plants considered in the SERAL project are limited to specialized or scarce habitats such as cliffs, vernal pools, fens (spring-fed seep or meadow areas containing 16 inches or more of peat), or "lava caps" (prehistoric volcanic ash mud flows also known as lahars and composed of andesitic tuff). Table 3 shows the habitat characteristics or affinities of the Sensitive Plants considered in the SERAL project. Some species are very closely associated with the specialized habitats listed. Others can be found in several similar specialized habitats. Not all habitat characteristics are listed. For example, some species prefer shallow, well-drained soil whereas others prefer deep soil with a high amount of organic matter. All the special habitats listed in these tables occur within the SERAL project.

Table 3. Habitat Affinities for Sensitive Plants.

	Soils, Geology			Canopy Closure			Elevation			Aspect	Special Habitats					
Species Name	**Andesitic Tuff**	**Granitic**	**Metasedimentary**	**Open**	**Partly Open**	**Closed**	**2,000'-4,000'**	**4,000'-6,000'**	**6,000'-7,000'**	**North**	**Ridge Tops**	**Cliffs, Outcrops**	**Meadows, Seeps**	**Vernal Pools, Ponds**	**Perennial Streams**	**Fens**
Allium jepsonii	●		●	●			●	●				●				
Allium tribracteatum	●			●			●	●	●		●					
Arctostaphylos nissenana			●	●			●									
Balsamorhiza macrolepis		●	●	●			●	●								
Boechera tularensis	●	●	●	●	●				●			●	●		●	●
Botrychium ascendens	●	●	●	●	●			●	●				●			●
Botrychium crenulatum	●	●	●	●	●			●	●				●			
Botrychium lineare	●	●	●	●	●				●				●		●	●
Botrychium lunaria	●	●	●	●	●	●			●				●		●	
Botrychium minganense	●	●	●	●	●	●		●	●				●		●	●
Botrychium montanum	●	●		●	●	●		●	●				●		●	●
Botrychium pedunculosum	●	●		●	●	●		●	●				●		●	●
Botrychium pinnatum	●	●	●	●	●	●			●				●		●	
Botrychium tunux	●	●	●	●	●				●			●	●		●	
Botrychium yaaxudakeit	●	●	●	●	●				●			●	●		●	●
Bruchia bolanderi		●			●	●		●	●				●		●	
Calochortus clavatus	●	●	●	●	●		●	●			●	●				
Cinna bolanderi		●	●	●	●				●				●		●	
Clarkia australis		●	●	●	●		●	●								
Clarkia biloba ssp. *australis*	●	●	●	●	●		●	●		●						
Cypripedium montanum		●			●	●	●	●		●				●		
Dendrocollybia racemosa		●	●		●	●	●	●	●	●						
Eriastrum tracyi		●	●	●	●		●	●								
Eriogonum luteolum var. saltuarium		●		●	●			●	●							
Erythronium tuolumnense	●	●	●		●	●	●	●		●		●			●	
Fissidens aphelotaxifolius		●			●		●	●	●	●		●			●	
Helodium blandowii	●	●		●					●				●			●
Horkelia parryi			●	●	●		●									
Hulsea brevifolia		●			●	●		●	●							
Iris hartwegii ssp. columbiana	●		●	●	●		●							●		
Lewisia kelloggii ssp. *hutchisonii*	●	●		●	●			●	●		●					
Lewisia kelloggii ssp. *kelloggii*	●	●		●	●			●	●		●					
Lomatium stebbinsii	●						●	●	●		●					
Meesia uliginosa		●		●					●				●			●
Mielichhoferia elongata			●	●	●		●			●		●				

	Soils, Geology			Canopy Closure			Elevation			Aspect	Special Habitats					
Species Name	**Andesitic Tuff**	**Granitic**	**Metasedimentary**	**Open**	**Partly Open**	**Closed**	**2,000'-4,000'**	**4,000'-6,000'**	**6,000'-7,000'**	**North**	**Ridge Tops**	**Cliffs, Outcrops**	**Meadows, Seeps**	**Vernal Pools, Ponds**	**Perennial Streams**	**Fens**
Mielichhoferia shevockii			•	•	•		•			•		•				
Mimulus pulchellus	•	•		•			•	•					•			
Peltigera gowardii		•			•	•	•	•	•	•					•	
Pinus albicaulis	•	•	•	•	•				•		•	•				
Tauschia howellii		•	•	•				•	•		•					

Allium jepsonii (Jepson's onion). This species is a perennial herb in the Lily family, Liliaceae. This species blooms from May – August. It has not been documented in Calaveras County; however, occurrences do exist for Tuolumne, El Dorado, Placer, and Butte counties.

Allium jepsonii grows on basalt or serpentine soils. Potential habitat has also been described as very thin, volcanic soils, which could be found on lava caps. The sites are usually open with no overstory. The elevation range for this species is 900' to 6,000'.

This species is not known from anywhere on the Stanislaus National Forest. There is a small amount of potential and unsurveyed suitable habitat within the project area.

Allium tribracteatum (three-bracted onion) is a perennial herb in the Lily family, Liliaceae. Torrey first described Allium tribracteatum in 1857. It is part of a complex of Alliums endemic to California with their distribution centering in the Sierra Nevada. Allium tribracteatum is distributed in Tuolumne County, California scattered on volcanic slopes and ridges (Mortola and McNeal, 1985). There is also at least one occurrence in Calaveras County.

Allium tribracteatum grows on gravely lahar (volcanic mud flow) soils, often referred to as "lava caps." The sites are usually open with no overstory. In some instances, brush species such as manzanita (*Arctostaphylos* sp.) may be present. While there are not usually commercial conifer species growing on these sites, there are sometimes stands of trees nearby. Allium tribracteatum usually grows on the thin volcanic soils near the tops of ridges where there is little competition. Due to the low moisture availability, A. tribracteatum usually reproduces from seed rather than from bulb offsets. The elevation range for this species is 4,000' to 6,500'. It blooms March to May.

There are approximately 33 known occurrences of Allium tribracteatum on the Stanislaus National Forest. Most are on the Mi-Wok Ranger District. The known populations of Allium tribracteatum range in size from 5 individuals to more than 10,000. Approximately 80 percent of the known occurrences on

the Forest are within the project area totaling over 400 acres. There is unsurveyed suitable habitat within the project.

Arctostaphylos nissenana (Nissenan manzanita) is a perennial evergreen shrub in the Ericaceae family. It blooms between February and March. It generally grows in rocky soils within chaparral habitat types.

Arctostaphylos nissenana is found at 13 locations El Dorado, Placer and Tuolumne Counties. Local occurrences are adjacent to the town of Sonora at about 2200 foot elevation. The rough bark of the main trunk and branches is the most ready means for identification in the field.

This species is not known from anywhere on the Stanislaus National Forest. There is a small amount of potential and unsurveyed suitable habitat within the project area.

Balsamorhiza macrolepis (big-scale balsamroot) is a perennial herb in the sunflower family, Asteraceae. It reproduces by seed. *Balsamorhiza macrolepis* var. *macrolepis* begins growing in late winter or early spring and blooms in mid-spring. The plant goes dormant during the summer, after seeds are produced.

The range of *Balsamorhiza macrolepis* var. *macrolepis* is the Sierra Nevada Foothills from Tehama County south to Mariposa County, and the interior Coast Range from Tehama County (Mendocino National Forest) south to Santa Clara County.

Balsamorhiza macrolepis var. *macrolepis* inhabits a variety of soil and plant community habitats. It has been reported from ponderosa pine forest, chaparral, vernally moist meadows and grasslands or grassland within oak woodland. Substrates are listed in CNDDB records (2021) as sandstone, serpentine, or basalt outcrop. The BLM occurrence in Mariposa County occurs on rocky clays of metasedimentary origin. The five Stanislaus NF occurrences are on sandy loams of granitic origin. *Balsamorhiza macrolepis* var. *macrolepis* is usually found in openings or under an open brush cover. The elevation range is listed as below 4,600 feet.

None of the known occurrences are within the project area. There is a small amount of potential and unsurveyed suitable habitat within the project area.

Boechera tularensis (Tulare Rockcress) is a biennial or short-lived perennial herb in the Brassicaceae family. The species flowers in June and July. *Boechera tularensis* is found between elevations of 6000-11000 ft. It prefers montane or subalpine areas, and may be found on rocky slopes, rock outcrops, near creeks or seeps, in or near meadows, on saddles, or in canyons. The only exposures reported are shaded and partially shaded. The soil is moist to dry, and loam, sand, gravel, or rock. It may be derived from volcanics, granite, limestone, or metamorphics. The surrounding vegetation is Jeffrey pine forest, red fir forest, lodgepole pine forest, or some other form of upper montane or subalpine coniferous forest.

The species is known from the southern high Sierra Nevada, with one disjunct site at Lake Tahoe (CNDDB 2021). The closest occurrences are located in Yosemite and Mono County. There are no known occurrences on the STF. There is unsurveyed suitable habitat in the project area.

Botrychium species life cycle and habitat attributes.

Botrychium species are perennial herbs in the Adder's-Tongue Family, Ophioglossaceae, and are closely related to ferns. The following information is summarized from the draft conservation assessment (Clines 2009). *Botrychium* species have a complicated life cycle, reproducing by spores and dependent

on mycorrhizal fungi for carbohydrates, mineral nutrients and water. The majority of the *Botrychium* life is spend under the soil surface, emerging above the soil after the first two to six years of life to produce spores. The spores are dispersed by wind but the majority stay within about five meters (16.4 feet) of the parent plant. The spores filter into the soil and, if an appropriate mycorrhizal fungi is present, they germinate into a haploid (1n) gametophyte (gamete-producing plant). The gametophyte produces gametangia, male and female reproductive structures, which produce sperm and eggs, respectively. Fertilization takes place underground on the gametophyte and a sporophyte (2n) grows on a short rhizome attached to the gametophyte. The sporophyte eventually produces one above ground leaf divided into a sterile segment and a reproductive segment. The reproductive leaf segment produces the spores (1n).

Because *Botrychium* species are completely dependent on mycorrhizal fungi, the plant community must have the right fungal partners, such as incense cedar trees, wild strawberry plants, twayblade (*Listera convallariodes*) and possibly trail plant, to produce the food taken up by the fungi and transferred to the *Botrychium*. The habitat must have the right moisture regime to support the fungi. In the Sierra Nevada, moist meadows, seeps and springs generally are habitats with favorable conditions. The rare *Botrychium* species are often found associated with uncommon soil or geologic formations, such as limestone deposits, or where springs bring water to the surface which has percolated through volcanic formations bringing unique minerals to the *Botrychium* site.

Botrychium ascendens (upswept moonwort). First described by Wagner and Wagner in 1986, *Botrychium ascendens* is widely scattered and rare in western North America. It is normally found in damp areas of wet meadows or in riparian areas in coniferous forests. It has also been found along the dryer areas of fens. It ranges from 4,800 to 11,000 feet in elevation.

The range of this moonwort is from southern Alaska to southern Nevada, and from the Sierra Nevada in California east to the Rocky Mountains. There are scattered populations in Quebec, Newfoundland, northern Minnesota and Vermont (Farrar 2011a). In California, it is known from Butte, El Dorado, Lassen, Modoc, Mono, Placer, Plumas, Nevada, Shasta, Tehama, Tulare and Tuolumne Counties (CNDDB 2021). Most California occurrences tend to be small, usually fewer than 20 plants each (CNDDB 2021). There are six known occurrences from the Stanislaus National Forest. One of them is on the Mi-Wok district. There are no known occurrences within the project area. There is unsurveyed suitable habitat within the project.

Botrychium crenulatum (scalloped moonwort) was first described by Wagner and Wagner in 1981. It grows in moist habitats including meadows, seeps, springs and riparian areas. It is often found on creek banks in conifer forest. The elevation range for the species is 4,800 to 12,000 feet.

Botrychium crenulatum has the widest distribution of the sensitive botrychiums across California. Most of the California occurrences are small, numbering fewer than 25 plants (CNDDB 2021). The range for Botrychium crenulatum extends through the western United States and western Canada. In California, the range extends from the Oregon border south through the Sierra Nevada into the Transverse Range. There are 37 occurrences known in the Stanislaus National Forest. Most of those occurrences are in the Calaveras Ranger District. One occurrence is in the Summit Ranger District. The one is in the Groveland Ranger District within the Rim Fire area. Three are in the Mi-Wok Ranger District, but is not within this project. There may be unsurveyed suitable habitat within the project.

Botrychium lineare (slender moonwort) is found in meadows and seeps, subalpine and upper montane coniferous forest above 4800 feet. California to Alaska and eat to Minnesota. There are only five known occurrences listed in CNDDB (2021) and six listed in Calflora (2021), the closest being in Mono County.

Threatened by fire suppression, grazing, mining, non-native plants, urbanization, logging, habitat disturbance, and foot traffic. Endangered in OR, and state-listed as Sensitive in WA.

Botrychium lunaria (common moonwort) occurs in moist habitats, often meadows, stream sides, seeps, and springs. At high elevations, it can occur in any well-drained, moist soils, including in scree slopes. At lower elevations, it can occur in dense forests as well as in meadows. It prefers soils with neutral pH (Farrar 2011b). It ranges from 6,400 to 11,200' in elevation in California.

Botrychium lunaria was once thought to have a circumboreal distribution occurring in both Europe and North America. Genetic and morphological analysis of specimens world-wide, completed in 2008 by Mary C. Stensvold, Iowa State University, revealed that the North American plants are quite different genetically from the European plants (Farrar 2011b). Stensvold proposed the name *Botrychium neolunaria* for those plants occurring in North America and retaining the name *Botrychium lunaria* for the European plants (Farrar 2011b). However, there has been no publication of this new name to date. Without a published name, the taxon remains in the Region 5 Sensitive List as *Botrychium lunaria*, with the understanding that the species in North America is synonymous with the unpublished name *Botrychium neolunaria*.

In North America, it occurs from Alaska to California, northern Arizona and New Mexico, the Great Lakes region and across Canada. In California, eight occurrences are documented in Modoc, Mono, Nevada, Sierra, Tulare and Tuolumne Counties (CNDDB 2021). However, only occurrences in Modoc, Mono and Inyo Counties (Farrar 2014b) and Tuolumne County have been genetically confirmed. Occurrences on federal lands include four sites on the Modoc National Forest, two sites on the Inyo National Forest, one reported site on the Tahoe National Forest (not represented by a specimen), and one site in Yosemite National Park (CNDDB 2014a). A number of the sites are very old and have not been relocated. There is one known occurrences in the Stanislaus National Forest. There is suitable unsurveyed habitat in the project area.

Botrychium minganense (Mingan moonwort) was first described in 1927 by Frere Marie Victorin from specimens collected from the Mingan Islands. The habitat varies from dense forest to open meadows and can be in nearly dry sites to saturated habitats such as fens and seeps (Farrar 2009).

Botrychium minganense has a wide range in North America. It occurs in 19 states and 12 Canadian provinces. There are over 100 California occurrences reported in CNDDB (2021), some of which are historic and not relocated in recent years. The range of the species in California is from the Oregon border south through the Sierra Nevada. There are six occurrences of Botrychium minganense in the Stanislaus National Forest. Two of these occur on the Mi-Wok Ranger District. One occurrence is in the Groveland Ranger District. This occurrence is made up of two colonies and grows in the same stringer meadow as the Botrychium crenulatum and Botrychium pedunculosum. There are no known occurrences in the project area and there may be unsurveyed suitable habitat within the project.

Botrychium montanum (western goblin) was described in 1981 by W. H. Wagner and F. S. Wagner from Lake County, Montana specimens (Farrar 2011b). It has a preference for dark, moist habitats, growing

under western red cedar (*Thuja plicata*) in the northern part of its range, and under incense cedar in California (Farrar 2011b). It occurs in moist soils with high organic matter along small to mid-sized streams, in fens, seeps and meadows especially where there are perennial plants known to be fungal partners (Farrar 2011b). The elevation range for this species is 4,900 to 7,000 feet (CNDDB 2021).

It occurs in scattered locations from southern Alaska, British Columbia, northeastern Montana, Northern Idaho, Washington, Oregon and California (Farrar 2011b). It is found in Butte, El Dorado, Fresno, Lassen, Modoc, Plumas, Shasta, Sierra and Tehama Counties (CNDDB 2021) and Kern County (Farrar 2011c). Occurrences in Kern, Modoc and Tehama Counties have been genetically confirmed (Farrar 2011c). Occurrences in Butte, Tehama and Kern Counties grow under incense cedar (Farrar 2011c). There is one reported occurrence in the Calaveras Ranger District of the Stanislaus National Forest. There may be unsurveyed suitable habitat within the project.

Botrychium pedunculosum (stalked moonwort) was described by W.H. Wagner. It occurs in mountain meadows, under conifers or tall forbs, and sometimes in forests or woodlands and on roadsides or on scree slopes (Farrar 2011d). The elevation range of this species is 4,800 to 7,000 feet.

Botrychium pedunculosum is found in the Rocky Mountains of northwestern Montana and northern Idaho and into northeastern Oregon (Farrar 2011c). There are disjunct occurrences in northeastern Quebec, northern Alberta and on the Alaska peninsula (Farrar 2011c). There has been only one occurrence found in California. It is located in the Stanislaus National Forest, in the Rim Fire Hazard Tree project at the same meadow as the known occurrences of *Botrychium crenulatum* and *Botrychium minganense*. This occurrence of *Botrychium pedunculosum* is made up of two colonies. It is the most southerly occurrence of the species currently known.

The known occurrence is in a stringer meadow situated on a contact zone between granitic bedrock and a lava cap. The meadow is spring fed. The plants are closely associated with incense cedar and other fungal partners at the known site. There may be unsurveyed suitable habitat within the project.

Botrychium pinnatum (northwestern moonwort) can be found in open or closed canopy lodgepole, red fir and yellow pine forests. It may also be found in moist fields (meadows) and shrubby slopes. Associated with calcareous or andesitic minerals. The elevation range is 4,800 to 7,000 feet.

There are 8 occurances listed in CNDDB (2021) and 12 listed in Calflora (2021). Mostly northern California, Plumas, Siskiyou and Modoc Counties. There is one occurrence on the Stanislaus National Forest. There is potential suitable unsurveyed habitat in the project area.

Botrychium tunux (moosewort) can be found on sparsely vegetated gravelly substrates, rocky stream terraces and well-drained rocky meadows that are calcareous influenced. The elevation range is 6,000 to 9,500 feet.

Known from only one location in Yosemite. Mariposa County. There is unsurveyed suitable habitat within the project area.

Botrychium yaaxudakeit (giant moonwort)

There is one occurrence listed in CNDDB (2021) located in Yosemite. There are three occurrences listed in CalFlora (2021), with the lowest elevation being 6,950 feet. There likely suitable unsurveyed habitat in the project area.

Bruchia bolanderi (Bolander's bruchia) is a rare, inconspicuous moss. First described from Yosemite National Park, it has been found in the central Sierra Nevada and in Oregon (Christy, 1980).

B. bolanderi occupies a specialized habitat within upper montane Sierran meadows (elevations approximately 3,800 to 8,200 feet), preferring vertical soil banks of small streams which meander through the meadows. It is somewhat ephemeral, dying back to the soil level. It can also occupy road cuts and head cuts.

Threats include fuel reduction projects that enter riparian zones and direct trampling by livestock and recreational activity (Dillingham 2006). There are five known occurrences in the forest. There are no known occurrences within the project area. The nearest occurrence is 5 miles away. There is unsurveyed suitable habitat in the project.

Calochortus clavatus (Pleasant Valley mariposa lily) is a perennial herb in the Liliaceae family. It blooms from May through July. It can be found in openings in mixed-conifer, ponderosa pine forests and, chaparral with southerly aspects and rocky soils. The elevation range is 2,800 to 6,000 feet.

The plant ranges from Mariposa county north to Placer County. There are 131 occurrences found in CNDDB (2021) with most occurrences in Eldorado county. There are two occurrences in Calaveras county on SPI owned lands within the Stanislaus National Forest approximately 9 miles north of the project area. It is not known from the project area or any Stanislaus National Forest lands. There is suitable unsurveyed habitat in the project area.

Cinna bolanderi (Bolander's woodreed) is a perennial herb in the grass family, Poaceae. It grows in wet meadows and along streams. Members of the genus *Glyceria* are similar in appearance to *Cinna bolanderi* and grow in the same habitat types. It is likely that *Cinna bolanderi* has been overlooked as a result. *Cinna bolanderi* grows in both granitic and metasedimentary soils. The elevation range of this species is 6,050 to 7,900 feet.

The range of *Cinna bolanderi* is the southern Sierra Nevada from Mariposa County to Tulare County. There are no known occurrences in the Stanislaus National Forest. However, there are occurrences in Yosemite National Park. There is suitable habitat within the SERAL project.

Clarkia australis (Small's southern clarkia) is an annual herb in the Evening Primrose family, Onagraceae. It reproduces by seed. Seedlings of *C. australis* can be found in the fall, after about two or more inches of rain. The appropriate identification period for *C. australis* is about late June through mid-August, depending on elevation and weather conditions. Seed is usually ready for dispersal within one and one-half months from onset of blooming. By the time seed is ready for dispersal, the plant has dropped its leaves and, for the most part, has died.

Clarkia australis is usually found on slopes with a south, southwest or southeast aspect. It grows in openings in ponderosa pine and mixed-conifer stands often in association with bear clover. Bear clover does not out-compete *C. australis*, probably because of the deep root system of bear clover compared to the very shallow roots of clarkia. *Clarkia australis* does not grow well with weedy annuals like grass, which out-compete it for moisture. It has not been found growing under dense stands of manzanita (*Arctostaphylos* sp.). It will grow on a site where manzanita is present in small numbers and in open areas within manzanita stands.

Clarkia australis prefers to grow in open sun or lightly filtered light conditions. Soil types and depths do not appear to be limiting. When not associated with bear clover, the species is usually observed growing in bare mineral soil or with a very light layer of leaf litter. *Clarkia australis* occurs between 2,500 and 6,000 feet in elevation.

Based on populations that have been tested and the foraging range of pollinators, there are about 250 occurrences of *Clarkia australis* within four fairly distinct, extended populations on the Groveland Ranger District. Testing has not been done on the Mi-Wok Ranger District, so *C. australis* can only be considered a tentative identification and is based on a geographical range. Occurrences of *Clarkia australis* range in size from one individual to thousands of individuals. As an annual, number of individuals in an occurrence can vary widely from year to year due to weather and site conditions.

There are no known occurrences within the project area.

Clarkia biloba ssp. *australis* (Mariposa clarkia) is an annual herb in the evening primrose family, Onagraceae. It reproduces by seed. Like *C. australis, C. biloba* ssp. *australis* germinates in the fall after two or more inches of rain and it dies after setting seed. The appropriate identification period for this species is mid-spring, approximately the month of June. The more common look-alike, *Clarkia biloba* ssp. *biloba* can intergrade with *C. b.* ssp. *australis.*

Clarkia biloba ssp. *australis* is most often found on north, northeast or northwest-facing slopes, usually under light shade. It is occasionally found on southwest or southeast-facing slopes. It is also sometimes found in direct sunlight. *C. biloba* ssp. *australis* tends to prefer "disturbed" sites - sites with little or no competition from more aggressive weedy species. In the natural setting, fire in the frequent-fire regime would be the disturbance agent.

Clarkia biloba ssp. *australis* was described in 1955 by Harlan and Margaret Lewis from specimens found in the Merced River Canyon. According to Lewis, *Clarkia biloba* ssp. *australis* originated within the Merced River Canyon. He asserts that any specimens found outside the Merced River Canyon are intergrades between the more common *Clarkia biloba* ssp. *biloba* and *C. biloba* ssp. *australis* (pers. comm. with J. Haas, June 15, 1996). However, since these occurrences fit the description of the species and represent specimens which contribute to an evolving genome, they are to be managed as *Clarkia biloba* ssp. *australis* (Jim Shevock, Regional Botanist, pers. comm. with J. Haas, July 2, 1996).

Clarkia biloba ssp. *australis* has limited occurrences in Mariposa and Tuolumne Counties. There are about 49 known occurrences of *Clarkia biloba* ssp. *australis* in existence. Of these, sixteen are known from the Merced River Canyon and its tributary canyons. Thirteen of these occur on lands managed by the Sierra National Forest and/or the Bureau of Land Management. Three are on land of unknown management or ownership.

Outside the Merced River Canyon and its tributaries, there are twelve known occurrences which match the description of *Clarkia biloba* ssp. *australis*. According to Lewis, these are "intergrades" between *C. biloba* ssp. *australis* and *C. biloba* ssp. *biloba*. Twenty-seven of these occurrences are on the Stanislaus National Forest, on the Groveland and Mi-Wok Ranger Districts. Two occurrences have been identified along Highway 120 right-of-way within the Groveland Ranger District. One occurrence is on private land in the Long Gulch area. One is on private land in the Greeley Hill area. The northernmost occurrence

was identified along in the Deer Creek drainage. There are two occurrences south of the Merced River: one on private land and one on land of unknown management or ownership.

The more common look-alike, *Clarkia biloba* ssp. *biloba*, is difficult to distinguish from *C. biloba* ssp. *australis*. Measurements on the petals area used to make the distinction. Although there may be a color difference as well, it has not been standardized to make it easy to use. These petal characteristics have been variable. During the past three years some populations that were classified as *C. biloba* ssp. *biloba* in previous years, had petals that keyed to *C. biloba* ssp. *australis* (J. Haas, personal communication). This change in petal characteristics raises the question of taxonomic identity of those plants that are identified as *Clarkia biloba* ssp. *australis* this year and whether petal characteristics are affected by weather or some other environmental factor. Since we are unable to differentiate the two subspecies completely this year, populations that fit the description of *Clarkia biloba* ssp. *australis* will be treated as the sensitive species as a means to protect all that may be the sensitive subspecies.

There are four known occurrences in the project area totaling 1.75 acres. There is unsurveyed suitable habitat.

Cypripedium montanum (mountain ladyslipper) is a perennial herb in the orchid family, Orchidaceae. It arises in early spring from shallow rhizomes and dies back by late summer. The appropriate identification period for this species is mid-spring, approximately mid-May to early June.

Cypripedium montanum inhabits sites, which are relatively undisturbed with a dense overstory, usually of Douglas fir or white fir. These sites are typically west or north-facing with fairly damp, deep loamy soils and a well developed duff layer. *Cypripedium montanum* requires a mycorrhizal fungi relationship for at least five years from germination. Mechanical disturbance to the rhizomes is usually fatal. *Cypripedium montanum* will sometimes survive a low-intensity fire in which most of the duff layer is left intact. However, it usually does not survive a fire of an intensity in which the duff layer is consumed (pers. comm. D. Knecht, with J. Haas, February 13, 1997). It has survived two local fires that were low-intensity in the area where it was growing.

Cypripedium montanum has a wide range but is rare within its range. It ranges from the central Sierra Nevada and central Coast Ranges in California, north into Alaska. It also occurs in Montana and Wyoming. In California, there are less than 110 occurrences on the National Forests. In the Central Sierra Nevada, there are about 33 occurrences between the Plumas, Stanislaus and Sierra National Forests and Yosemite National Park. There is one known occurrence in the project area.

Collybia racemosa (branched collybia; syn *Dendrocollybia racemosa*) is a saprophytic mushroom which is widespread in the Northern Hemisphere but always locally rare. This species is found on rotting or mummified remnants of agaric mushrooms, or occasionally in nutrient-rich leaf mulch in forests (Cushman and Huff 2007). The species has been found in older forests of coast live oak, Douglas-fir and tanbark oak, along riparian areas, and in other types of conifer forests. Populations are most likely to occur on wet, north facing slopes or in riparian areas with a perennial stream. The elevation range of the species is 2,500 to 7,000 feet.

Populations are known from the western portions of Washington, Oregon, and northern California. There is one occurrence on private land within the boundary of the Mi-Wok Ranger District (USDA 2013a).

Eriastrum tracyi (Tracy's Eriastrum) is an annual member of the Phlox Family, Polemoniaceae. It grows in sunny openings in chaparral and mid-elevation woodlands. The soils are usually gravelly shale or loam, coarse granitic sand, stony clay loam or adobe. The elevation range is 1,000 to 5,400 feet.

Eriastrum tracyi occurs in northern California in Shasta, Trinity and Tehama Counties; in central California in Santa Cruz and Stanislaus Counties; and in the Southern Sierra in Fresno, Tulare and Kern Counties. There are three occurrences in the Shasta-Trinity National Forest, three in the Lassen National Forest, one in the Mendocino National Forest, 1 in the Sierra National Forest and another just outside the Sierra Forest boundary, seven in the Sequoia National Forest, seven on BLM lands and 26 in private and unknown ownership areas (USDA 2012b, CNDDB 2014). No occurrences are known within the Stanislaus National Forest. However, surveys have not been conducted in the past and suitable habitat is present in the SERAL project.

Eriogonum luteolum var. saltuarium (Jack's buckwheat) is an annual herb in the buckwheat family, Polygonaceae. It was described in 1989 by James Reveal from plants collected from the Dardanelle area of the Stanislaus National Forest and named for his father, former District Ranger Jack L. Reveal (Summit Ranger District, 1948-1960) (Reveal 1989). This high Sierra species blooms July through September. It grows in sandy granitic soils in in montane conifer forests and sagebrush communities. The elevation range is 5,600 to 7,400 feet.

There are four occurrences in CNDDB (2021), three of those are from the Stanislaus National Forest. One is the Dardanelle vicinity location mentioned above, one from the vicinity of the Eureka Valley Campground on Highway 108. It is also reported from the Brightman area. The species was also collected from along Highway 89 in the vicinity of Luther Pass, Alpine County. In multiple surveys (up to five in some areas), this species has not been found at the sites where it was formerly collected. All of those areas are near a river and get a lot of recreational foot traffic in July when this annual would be blooming and setting seed. They have also been affected by increasing shade and litter from conifers.

At Rare Plant Treasure Hunt in 2012 Daniel Slakey found this species up a little used trail (Slakey 2012). A check in 2017 mapped more areas near these initial sites and found two other areas down near Highway 108. There are fewer than 500 plants known in all of these occurrences. Many plants appeared to be drying before setting seed. In 2018 a revisit showed about 200 plants. The Donnell fire burned through the main occurrence that following fall and burned all the shrub that were shading it. The following year approximately 300 plants were seen and many were much larger than what had been seen previously. The plants found on dry slopes are much smaller than those growing on flats near the river. The variety appears to be on a downward trend.

The nearest occurrence is approximately 8 miles from the project area. There may be unsurveyed suitable habitat in the project area.

Erythronium tuolumnense (Tuolumne Fawn Lily) is a perennial herb in the lily family, Liliaceae. It reproduces by both seed and offsets. *E. tuolumnense* emerges above ground in early March. The appropriate identification period for this species is early spring, approximately March through April, depending on elevation and weather conditions. The aboveground plant parts dry and shrivel up soon after blooming, becoming impossible to identify.

Erythronium tuolumnense tends to grow on shady, north-facing slopes. Many sites either have water flowing through the drainages with moist saturated soils or saturate soils in the form of springs or vernal seeps. The soils range from granitic clay-loams to rocky pockets of metasedimentary clays to bare granitic outcrops or volcanic lahar formations. In all cases, the is rock on or near the surface of the soil with abundant soil moisture during the growing and blooming period. Most *Erythronium tuolumnense* occurrences are found growing in chaparral, oak woodland, or ponderosa pine plant communities. The elevation range for this species is 1,200' to 5,000'.

Erythronium tuolumnense was first collected by W. C. Blasdale on June 7, 1895. There are 43 known occurrences all in Tuolumne County. Several occurrences are found on private property. Although suitable habitat exists on the Groveland, Summit, and Calaveras Ranger districts, the species has so far been found only within the boundaries of the Mi-Wok Ranger district.

Approximately 80 percent of the known occurrences on the Forest are within the project area totaling over 790 acres.

Fissidens aphelotaxifolius (brook pocket-moss) is a true moss in the pocket-moss family, Fissidentaceae. It is identifiable throughout the year. It has no dormant or non-living time of year.

Fissidens aphelotaxifolius inhabits “wet soils, humus, and rocks along streams, near waterfalls, [and] in damp crevices of cliffs” (Pursell, 2005). It is not expected in areas where peak flows wash mosses away. The species grows from sea level to 6,300 feet in elevation.

Fissidens aphelotaxifolius has a wide geographic range but is rare within its range. It is known from only two occurrences in California: one in Madera County in the Sierra National Forest, the other in Siskiyou County in the Klamath National Forest. *Fissidens aphelotaxifolius* also occurs in Oregon, Washington and British Columbia. The range in California for *Fissidens aphelotaxifolius,* therefore, extends from northern California, through the Sierra Nevada and through the Sierra National Forest. There are currently no known occurrences of Fissidens aphelotaxifolius in the Stanislaus National Forest.

Helodium blandowii (Blandow’s bog moss) can be found in wet meadows, fens and seeps in subalpine conifer forest and alpine lake edges. The elevation range is 6,500 to over 9,000 feet. There are recorded occurrences in Tulare, Fresno, Mono, Tuolumne, Alpine and Siskiyou Counties (CalFlora 2021).

There are fewer than 20 occurrences in CNDDB (2021). There is one known occurrence on the Stanislaus National Forest near Kennedy Lake in the Emigrant Wilderness Area. There is potential unsurveyed suitable habitat in the project area.

Horkelia parryi (Parry's horkelia) is found in open chaparral and foothill woodlands with low pH soils. The elevation range is up to 5,000 feet (CalFlora 2021).

There are 44 occurrences reported in CNDDB (2021). It is found in Mariposa, Tuolumne, Calaveras, Amador and El Dorado Counties. There are about 20 occurrences across Groveland, Mi-Wok and Calaveras districts. There is one known occurrence in the project area.

Hulsea brevifolia (short-leaved hulsea) is a perennial herb that grows in partial shade in red fir forests and on gravelly soils in montane forest. The elevation range is 4,900 to 8,500 feet. There are 64 known occurrences in CNDDB (2021), it is known from Tulare, Fresno, Madera, Mariposa and Tuolumne Counties.

It is not known in the Stanislaus National Forest. The nearest occurrences are along Highway 120 in Yosemite National Park.

Iris hartwegii ssp. columbiana (Tuolumne iris) grows on dry, open or partially shaded slopes in foothill woodlands and yellow pine forests. It occurs at elevations ranging from 1,350 to 5,000 feet.

There are nine known occurrences on the Forest. All of them are located within the project area totaling 42 acres. There is additional unsurveys suitable habitat in the project area.

Lewisia kelloggii ssp. *hutchisonii* (Hutchison's bitterroot) is a perennial herb in the miner's lettuce family, Montiaceae. *Lewisia kelloggii* ssp. *hutchisonii* grows on open rocky ridge tops or flat openings in granitics or volcanic "lava caps" with widely spaced trees in partial to full sun. Most soils are reported to be sandy granitic to erosive volcanic with granitic boulders. Plants are often visible during June and July and then dry up and disappear later in the summer after setting seed. The elevation range is 4,500 to 7,000 feet (USDA 2013).

Lewisia kelloggii ssp. *hutchisonii* is restricted to the Klamath Range and northern Sierra Nevada, California. This plant is endemic to Butte, Sierra, Plumas, Nevada, El Dorado, Amador, Calaveras, and Tuolumne Counties. There is habitat for this species that has not been surveyed. There are no known occurrences in the project area.

Lewisia kelloggii ssp. kelloggii (Kellogg's lewisia) *is a perennial herb in the miner's lettuce family, Montiaceae. It is closely related to Lewisia kelloggii ssp. hutchisonii and was described by the same researchers at the same time (Wilson, et. al. 2005). It is restricted to open, gravelly or sandy flats within mixed conifer forest and subalpine forest. After setting seed, the plants wither and go dormant, becoming invisible and impossible to detect. The elevation range is 6000 to 11,000 feet.*

Lewisia kelloggii ssp. kelloggii is endemic to California. It is known from at least 25 locations from Plumas County southward to Madera County and one occurrence in Humboldt County (USDA 2013). Some populations are large, composed of several hundred plants, some are smaller. Little information exists on population numbers. There are at least 10 sites in Yosemite, including "almost all the domes surrounding Yosemite Valley, especially Sentinel Dome and Mt. Watkins*" (Botti 2001, USDA 2013).* There is unsurveyed suitable habitat in this project.

Lomatium stebbinsii (Stebbin's lomatium) is a perennial herb in the carrot family, Apiaceae. It emerges from the underground tuber and blooms soon after snowmelt. This can initiate as early as January and may continue into late May depending on the spring snowfall. Soon after seed dispersal the aboveground portions of the plant have dried and blown away.

G. Ledyard Stebbins discovered *Lomatium stebbinsii* in 1971. In June of 1971 he examined specimens and described the type locality as, "specimens scattered over the thin-soiled, almost bare ground in volcanics (mud-flow breccia) northwest of Bald Mountain near Highway 108 at 5,600ft. (Schlessman and Constance. 1979).

Lomatium stebbinsii grows on ridgetops and slopes in lahar soils (volcanic mud flow formations). These soils are high in clay content and are generally rocky. Soils are usually fairly shallow. It is often found growing with Allium tribracteatum. The elevation range for this species is 4,500' to 7,000'. It blooms March to April.

There are approximately 90 known occurrences of *Lomatium stebbinsii* on the Stanislaus National Forest. All except six of the known occurrences exist on the Mi-Wok Ranger District, the other occurrences are known from the Calaveras and Summit Ranger Districts. The known populations of Lomatium stebbinsii range in size from 75 individuals to approximately 10,000. Approximately one third of the known occurrences on the Forest are in the project area totaling nearly 500 acres.

Meesia uliginosa (broad-nerved hump-moss) occurs in meadows and fens on dead/decomposing wood, usually in the subalpine zone at 4,000 to 9,500 ft. There are no known occurrences of this moss on the Stanislaus National Forest.

Mielichhoferia elongata (elongate copper-moss) occurs in all types of seasonally or perennially moist rock outcrops, often with high copper or heavy metal content, at lower elevations of foothill woodland, and occasionally coniferous forest. This moss ranges in elevation up to 3,500 feet. There are 20 known occurrences listed in CNDDB (2021). CalFlora (2021) lists three occurances within the Stanislaus National Forest, all of them located on the Groveland Ranger District. There is potential suitable habitat in the project area.

Mielichhoferia shevockii (Shevock's copper-moss) occurs on rock outcrops which are seasonally or perennially moist in foothill woodland and oak/chaparral communities. It ranges in elevation from 1,500 to 5,000 feet.

Only six occurances appear in CNDDB (2021). None of them are in Tuolumne County. Not known in the Stanislaus National Forest.

Mimulus pulchellus (pansy monkeyflower) is also an annual herb in the Lopseed family, Phrymaceae (previously Scrophulariaceae). The times for germination and identification are similar to those for *Mimulus filicaulis*. *Mimulus pulchellus* blooms one to two weeks earlier in most years. It grows in vernally wet to moist sites which are usually flat or with a slight slope. It prefers to grow in areas with little competition. The elevational range for this species is 3,000 to 5,000 feet.

Mimulus pulchellus is endemic to Calaveras, Mariposa and Tuolumne Counties. It is found in the Stanislaus National Forest, Yosemite National Park and near the town of Mariposa, not far from the Sierra National Forest. It occurs in the Chowchilla River watershed (near Mariposa), and the Merced, Stanislaus and Tuolumne River watersheds. There are several known occurrences of *Mimulus pulchellus* in the Stanislaus National Forest. All of the occurrences from the Mi-Wok district are within or directly adjacent to the project area. There remains unsurveyed suitable habitat within the project.

Peltigera gowardii (Goward's waterfan; syn *Hydrothyria venosa, P. hydrothyria*), formerly known as *Hydrothyria venosa* (veiny aquatic lichen, or waterfan) is an aquatic lichen in the Peltigeraceae. It was also known until recently by the scientific name *Peltigera hydrothyria*. It is identifiable year 'round, having no dormant or non-living period. There are no other similar appearing species of lichens which are totally aquatic in California.

Peltigera gowardii grows in clear, shallow streams fed by cold water springs. The water is very clear and peak flows are not of the intensity that would lead to scouring. The streams rarely are more than 8 inches in depth. It ranges up to about 8,000 feet in elevation.

This species is found in cold unpolluted streams in mixed conifer forests along the western slope of the Sierra Nevada on the Plumas, Sequoia, Sierra, and Stanislaus NFs. It is also found in the northern coast range in the Mendocino NF, and northwestern California in the Shasta-Trinity NF. Based on its currently known distribution, its range in California also includes the Eldorado, Tahoe, LTBMU, Lassen, Klamath, Six Rivers, and possibly Inyo National Forests.

The CA occurrences were recently segregated through genetic work from populations which occur in the eastern states of Massachusetts, New Hampshire, Vermont, Tennessee and Georgia (Lendemer and O'Brien 2011). *Peltigera gowardii* also occurs in Oregon, Washington and British Columbia. Additional genetic work might further separate *Peltigera gowardii* from populations in Colorado.

In the central Sierra Nevada, there are eleven occurrences in the Sierra National Forest, two in the Sequoia National Forest, and two in Calaveras Big Trees State Park. Nineteen occurrences are known from the Stanislaus National Forest. There are no known occurrences within the project area. The nearest location is just over 1 mile away. There is suitable habitat in the project area.

Pinus albicaulis (white bark pine) grows in usually open subalpine habitats, sunny to shaded on weakly developed soils. Upper red fir forests up to timberline above 7,000 feet. There are multiple occurrences of this species on the Forest, all of them are recorded above 8,400 feet and mostly within wilderness areas and right at the Sierra crest.

There is slight potential for this species to be present in the project area.

Tauschia howellii (Howell's Tauschia) is a perennial herb in the carrot family, Apiaceae. It grows in openings in red fir forests on granitic gravel on ridge tops (Jepson Flora Project 2014). It is also found in decomposing granite soils, in mountain hemlock forests and on upper slopes of ridges (USDA 2013b). The elevation range of the species is 5,600 to 8,200 feet.

Tauschia howellii has a limited distribution in southern Oregon, where it is a Candidate for State Listing, Siskiyou County, Sierra County and Fresno County. There are nine occurrences in the Klamath National Forest, two in the Tahoe National Forest, and one in the Sierra National Forest (USDA 2013b). There are no currently known occurrences in the Stanislaus National Forest. There is suitable habitat within the SERAL Project.

Effects of Proposed Project

In the SERAL analysis area there are several occurrences of the eight sensitive species previously documented, and the area is likely to contain additional undiscovered populations. In addition, the analysis area contains suitable habitat for 32 sensitive plant species with no known or as-of-yet discovered populations (Table 1). There are also at least three other species from the Forest Watchlist and Botanical Special Interest documented in the project area. The following effects analysis will discuss the effects of the proposed project actions on sensitive plants in broad and general terms since the precise location and/or amount of treatment in each area has not yet been determined. Biological determinations and effects for each species will be given on a project-wide basis. The goal is to discover and protect sensitive plants in the project area, but due to the size of the project and the difficulty, or unlikelihood, of achieving a 100% detection rate, effects to sensitive species are likely to occur. In

addition, all suitable habitat cannot be avoided and adverse effects to these habitats cannot be adequately mitigated through project planning or with the use of management requirements because some of the habitats are the focus of some of the proposed treatment types.

The following section includes effects analysis for all alternatives considered in detail where the actions would affect sensitive plants. The activities proposed in Alternatives 1, 3 and 4 are essentially the same except for number of acres proposed for treatment and Alternative 4 would not include the use of herbicides for invasive plant treatments. The activities planned for the project include prescribed fire via broadcast, understory, jackpot, or piling and burning techniques, understory and surface fuel reduction using mastication or machine piling and burning, forest thinning using conventional timber harvest methods, construction and maintenance of fuelbreaks using a combination of the previous treatments, and non-native invasive weed control and eradication treatments. The project also includes salvage and removal of any insect-, disease-, drought- or wildfire-killed hazard trees located along maintenance level 2, 3, 4, and 5 NFS roads and temporary road construction, road and trail maintenance necessarily to implement the activities and to generally improve road conditions in the project area. Because the effect of the activities would be the same for all action alternatives and the same management requirements for protection of sensitive plants would apply to each, the effects considered in detail, in this section apply to Alternatives 1, 3 and 4.

Alternatives 1, 3 and 4

Direct and Indirect Effects - Direct effects are effects that are caused by the action and occur at the same time and place. Indirect effects are effects that are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable (40 CFR 1508.8).

Sensitive Plant occurrences would be flagged and avoided, thereby eliminating the possibility of direct impacts except for some occurrences of Clarkia australis, Clarkia biloba ssp. australis and Mimulus pulchellus. In some of these occurrences, manual fuel reduction would be allowed during the dry non-growing period when the species are present as seed, not living plants. These occurrences would be less vulnerable to loss as seed than as living plants. Mastication and legacy skid trail subsoiling to alleviate compaction would also be allowed within occurrences of Clarkia australis during the dry, non-growing period. In addition, some of these species populations may be impacted by prescribed fire when conducted in the spring (growing season) because fire would be allowed to back into up to 20% of known populations. Therefore, the management requirements might not completely alleviate adverse effects. At no time are the impacts to the Clarkia australis, Clarkia biloba ssp. australis and Mimulus pulchellus occurrences expected to be so great that an entire occurrence would be eliminated. For this section, the term "impact" refers to any disturbance which might adversely affect Sensitive Plants.

Clarkia australis and *Clarkia biloba* ssp. *australis* and bank seed in the soil. *Mimulus pulchellus* likely banks seed in the soil. The management requirements restrict the types and timing of activities which can be implemented in Sensitive Plants sites. Two types of activities would be allowed within *Clarkia biloba* ssp. *australis* and *Mimulus pulchellus* occurrences: manual fuel reduction (cutting of brush or small trees) and only during the dry, non-growing period and spring (growing season) prescribed fire. Impacts within occurrences of these species would therefore, occur in no more than two consecutive years. Manual fuel reduction, mastication and legacy skid trail subsoiling would be allowed within occurrences of *Clarkia australis,* also during the dry non-growing period. There is a chance that impacts could occurred within some occurrences of *Clarkia australis* over consecutive years. However, none of

the impacts are expected to be of such an intensity or cover so much of the occurrences that entire occurrences would be lost. Restricting the timing of impacts and, in the case of *Clarkia australis,* restricting the amount of an occurrence disturbed by masticator tracking reduces the risk of eliminating the viable seed banks. The management requirements would therefore reduce, minimize or alleviate the possible adverse effects of this project to occurrences of these species.

Disturbance during the non-growing season would be likely to do less harm to the annual species *Clarkia australis, Clarkia biloba* ssp. *australis* and *Mimulus pulchellus* than disturbance during the growing season since there would be no plants affected. Only the seed and habitat would be affected. Prescribed fire in the spring would only be allowed to back into 20% of known populations and it is expected in the areas where these species of sensitive plants occur would be somewhat resistant to a backing fire, or not burn at all. Knapp, et al. (2007) found that species were not significantly affected by burn season, fire's effects appear to depend more on the amount of fuel consumed and the resulting fire intensity than the plant phenological stage.

Any type of ground disturbance to Sensitive Plants during the growing season would cause loss of plants. The number of plants killed would vary according to species, how many plants were on the site and the type, degree and amount of disturbance. The growing season for the Sensitive Plants in this proposed project varies from species to species.

There might be occurrences of Sensitive Plants occurring in roadside hazard tree removal areas which might not be completely avoided to mitigate a hazard to public and worker safety. There might be instances where a botanist would work with a sale administrator to minimize the amount of an occurrence impacted to abate a hazard. In this situation, the smallest possible portion of the occurrence would be impacted with the tree falling and removal or fuel abatement. No occurrences are expected to be eliminated because of this situation.

Balsamorhiza macrolepis has been observed growing after wildfire and after manual fuel reduction in its habitat in Mariposa County. These perennial plants would be most able to endure these types of impacts after entering dormancy in late summer.

Botrychium species might be sensitive to some habitat altering impacts. Any type of ground disturbance which damages or eliminates the fungal partners, which include wild strawberry, twayblade, trail plant and incense cedar trees in the immediate vicinity of the *Botrychium* plants, could reduce or eliminate the mycorrhizal fungi. The fungal partners contribute carbohydrates from photosynthesis and nutrients from the soil to the fungi. The fungi absorbs additional nutrients from the soil and transfers moisture and the collected nutrients to the *Botrychium* species which appear to photosynthesize very little and only when a leaf is produced aboveground. *Botrychium* species have no root hairs with which to absorb nutrients or moisture from the soil. Therefore, the *Botrychium* species are dependent on the fungi for moisture and nutrients. If the fungal partners in the vicinity of *Botrychium* plants are lost or reduced because of the project activities, then the fungi which sustain the *Botrychium* plants could be reduced or lost, resulting in a reduction or loss of *Botrychium* plants. The number of plants lost would vary according to the type, degree and amount of disturbance.

Botrychium plants appear to tolerate loss of leaves through herbivory and low intensity fire (Clines 2009). Since the plants are not dependent upon photosynthesis for food production, the loss of leaves might simply result in an interruption of spore production. However, interruption of spore production

through annual or consecutive year impacts could result in a reduced amount of new plant recruitment. The number of plants in an occurrence might become reduced as a result.

Studies of *Botrychium* species indicate that some species like to occupy habitats which were disturbed 15 to 50 years previously. *Botrychium minganense* is one of these in some parts of its range, sometimes being found in habitats which had been disturbed more than ten years previously (Clines 2009). However, in the western states, *Botrychium minganense* appears to be found mostly in old forest habitats (Clines 2009). *Botrychium ascendens, Botrychium lineare,* and *Botrychium pedunculosum* also appear to occupy sites of past disturbances in some parts of their range (Farrar n.d. b., 2011a, 2011d). *Botrychium pedunculosum* is sometimes found on roadsides or in second growth forests (Farrar 2011d). *Botrychium crenulatum, Botrychium lunaria, Botrychium montanum* and *Botrychium pinnatum* are not strongly associated with disturbed habitats (Farrar n.d. a., 2011b, 2011c, 2011e). While some *Botrychium* species can be found on sites which had been disturbed in the distant past, it is unlikely that those disturbances would be beneficial to the living plants when the disturbance occurs. The *Botrychium* plants likely colonized the sites after the disturbance had taken place, possibly from an undisturbed site nearby.

Clarkia australis is a "disturbance plant." For this species, this means that it prefers to germinate and grow on a site which has had competing vegetation removed. Under natural circumstances, fire in the frequent fire regime is the removal agent. *Clarkia australis* appears to have some resilience to mechanical impacts by heavy equipment at some point during the year. Plants have been observed growing where machinery had passed in previous years. It is believed that the impacts occurred after the plants set seed or that plants had been left unharmed and seeded into the disturbed area.

The habitat of *Clarkia australis* (exclusive of the plants) might be improved by introduction of disturbance to the soils by removing competing plants. *Clarkia australis* has been observed growing in road cut banks and on fill slopes. It has also been observed growing in abandoned skid trails. In most of these cases, there are plants still living on natural ground next to the roads and skid trails. The value of the improved condition of the habitat would be dependent on the numbers and subsequent reproductive success of the Sensitive Plants remaining on the site. If the occurrence is diminished to a degree beyond which it could recover, the value of the improved condition would be very low. Since population viability thresholds have not been determined for *Clarkia australis*, it isn't possible to determine at what point a disturbance effect would change from favorable to unfavorable. Additionally, encroachment of more aggressive annual plants such as non-native grass may preclude an otherwise improved condition of the habitat. The duration of these effects would be dependent on the amount of an occurrence impacted plus the introduction and rate of spread of encroaching competing plants.

Clarkia biloba ssp. *australis* tends to inhabit areas which have had past disturbances. In the Merced River Canyon, some occurrences inhabit talus slopes, which generally exhibit some amount of surface movement of rock through the year. *Clarkia biloba* ssp. *australis* grows prolifically on the cut banks of Cherry Lake Road, which exhibit a fair amount of yearly soil erosion due to the coarse sandy granitic soils in some areas.

Conducting mastication or legacy skid trail subsoiling within occurrences of *Clarkia australis* after the living plants have set seed and died could cause damage or death to some of the seed. Some seed might be buried too deeply in the furrows made by the equipment working within the occurrences. When seed is buried too deeply, it will not germinate, leading to a possible reduction of the occurrence.

Additionally, the physical impact of the equipment tracks on the seed might cause damage or death of some of the seed. These effects are mitigated by not allowing equipment to track through occurrences smaller than 0.25 acre and to minimize tracking through occurrences larger than 0.25 acre. These mitigations greatly reduce the risk that occurrences of *Clarkia australis* would be eliminated by these activities. Therefore, the intensity of the impacts would be low to moderate. The duration of the effects (reduction of occurrence numbers from seed loss) of the impacts would be short-lived, provided that there is not a rapid influx of weedy competitive species. In the absence of weeds, the recovery of the *Clarkia australis* plant numbers should take two to three years.

The benefit of conducting mastication within occurrences of *Clarkia australis* is that the buildup of fuels from the small dead trees which would eventually fall or the dead brush which would contribute to fuel loading would be reduced, thereby reducing the risk that the occurrences could be lost during the next wildfire event. Additionally, mastication might help prevent or reduce the establishment of dense brush which might otherwise dramatically reduce the quality of the habitat for the *Clarkia* which prefers to grow in forest openings with little or no competition from other plants. The intensity of the benefits of mastication would be low, since the benefits are related to preventing a possible future wildfire. The intensity of the benefit of breaking up compaction in an occurrence area could be great, if the soil is very compacted. The duration of the benefits is expected to be long-term. While the mastication wouldn't prevent brush from taking over a site over the long term, the benefit of reducing the dead wood fuel component, thereby possibly preventing a higher burn severity in a future wildfire would last many years. The benefit of reducing soil compaction would also last many years.

There is a low to moderate risk that conducting manual fuel reduction and prescribed fire within occurrences of *Clarkia australis*, *Clarkia biloba* ssp. *australis* or *Mimulus pulchellus* could cause damage to or death of some of the seeds when implemented either during the dry, non-growing period or in the spring. The risk would come from trampling by workers walking or standing within the occurrences while they work or loss of live plants during burning. Timing this work is critical in ensuring that the activity does not cause loss of entire occurrences. The amount of seed damaged or lost is expected to be minimal. The benefit of conducting fuel reduction within these occurrences is that the fuel loading caused by the standing dead brush or trees would be greatly reduced or eliminated, thereby reducing the risk that these occurrences might be lost in a future wildfire. The intensity of effects from this activity would be low. The duration of seed loss should be short-term, two to three years, while the seed banks rebuild. The duration of the benefits should be long-term.

Clarkia australis, Clarkia biloba ssp. *australis* and *Mimulus pulchellus* all appear to be well adapted to the frequent fire regime of the Sierra Nevada. *Clarkia australis* was observed thriving in numerous locations in the years immediately following several wildfires on the Groveland Ranger District, including the 1987 Stanislaus Complex, the 1990 A-Rock Fire and the 1996 Ackerson Complex. *Clarkia biloba* ssp. *australis* was observed growing in several locations the year following the 1999 Pilot Fire. *Mimulus pulchellus* were observed vigorously growing the spring after a prescribed fire was implemented in a meadow where the species occur. All of these wildfires and the prescribed fire occurred after the plants had matured and produced seed.

This post-fire increase in the numbers of *Clarkia australis, Clarkia biloba* ssp. *australis* and *Mimulus pulchellus* is usually short-lived. All of these Sensitive species have been observed rapidly thinning out

with the influx of more aggressive weedy species such as the non-native annual grasses like cheatgrass (*Bromus tectorum*).

Mimulus pulchellus is a species which appears to accept some disturbance. It has been observed growing in gopher mounds and in tire tracks left in the soil, where competing vegetation was sparse or lacking. It is unclear how much mechanical disturbance they may tolerate without adversely affecting the viability of an occurrence. Since they are delicate annuals, it is probable that any resistance to disturbance is highest after most of the plants have set seed and the soil has dried. It is unknown how many years the seed would remain viable or how ground-disturbing activities would impact their seed "banks." If seed viability is short-lived, mechanical impacts which occurred prior to seed set could possibly reduce or eliminate an occurrence.

Cypripedium montanum is intolerant of moderate to high intensity fire. The rhizomes grow near the top of the soil, about one inch below the surface. The heat of ground fire, particularly from the burning duff or woody debris over the rhizomes kills the rhizomes and mycorrhizal fungi. Sometimes *Cypripedium montanum* plants survive the fire but are not able to survive the loss of the overstory. Monitoring of occurrences on the forest within previous large fires has revealed that the occurrence did not survive the impacts of the fire, the opening of the habitat and subsequent grazing pressure.

Horkelia parryi seems to tolerate some amount of soil disturbance at some point in the year. One large occurrence on the Groveland Ranger District, was burned in the 1987 Stanislaus Complex Fires. The burned timber on the site was logged and the site was prepared for planting by deep tilling. The occurrence appeared vigorous and recruited new plants outside the originally discovered occurrence boundaries for several years. However, eight to ten years after planting, the *Horkelia parryi* had lost that vigor and appeared to be in decline, apparently from the dense overstory and needle cast of the plantation conifers.

There might be some indirect adverse effects to occurrences of Sensitive Plants, not prevented by the management requirements for this alternative. Mastication and logging activities adjacent to “lava cap” habitats could unintentionally create OHV access to these fragile habitats which can be home to Sensitive species such as *Allium tribracteatum, Lomatium stebbinsii, Lewisia kelloggii* ssp. *hutchisonii, Lewisia kelloggii* ssp. *kelloggii* and *Mimulus pulchellus*. These habitats are often mistakenly assumed by the uninformed to be barren and with no value. They can be quite rich in native botanical diversity, hosting plant species not found in the more common forest or chaparral ecosystems. Some of the lava caps in the project area famously produce early spring wildflower blooms enjoyed by the public. Impacts from off-trail vehicle driving can cause substantial damage to these habitats, killing rare plants, compacting soil, causing erosion and introducing disturbance favoring weedy species. The intensity of these effects could be moderate to great, depending on the type of driving that occurs. A single trail through a site would localize the impacts to a narrow footprint. However, if many tracks are made or if drivers engage in “drifting” or “spinning donuts,” in the habitat, the intensity could be extremely high. The duration of these effects would last until the activity is detected and measures are put in place to stop the activity and make repairs to stop soil erosion.

The proposed activities have the potential to impact individuals and suitable habitat if the species is present. Mechanical treatments can crush individual plants or disturb the thin and fragile soils that compose the species habitat. Construction and maintenance of fuel breaks include areas of suitable habitat. Because the species habitat occurs in rocky, thin soils and lava caps, those areas are not

expected to be directly affected by mechanical treatments but may be directly adjacent to proposed operations. Use of prescribed fire has low potential to impact individuals or habitat. Treatments proposed for control or eradication of invasive species using herbicide could have negative impacts on individuals or entire population occurrences. Manual invasive species treatments would pose minimal risk to the species.

Individuals and population occurrences if found would be flagged and avoided for proposed treatments with potential to negatively impact the species. Lava cap areas will be avoided during implementation. Where proposed invasive species treatments will take into consideration species vulnerabilities to herbicides and manual treatments and be implemented to minimize or eliminate negative effects.

There is a possibility that invasive plant species seed could be carried to some of the special habitats with the various aspects of the implementation of this project, thereby introducing the weed to rare plant habitat. The lava caps are particularly vulnerable to weed infestation. Some of the invasive weeds present such as cheatgrass, have the potential to alter normal fire behaviors. These adverse effects could affect *Allium tribracteatum, Lomatium stebbinsii, Lewisia kelloggii* ssp. *hutchisonii, Lewisia kelloggii* ssp. *kelloggii* and *Mimulus pulchellus*. The intensity of these effects could be great and would likely be permanent.

The Sensitive aquatic lichen *Peltigera gowardii* grows in small, shallow streams where scouring and sedimentation are limited or lacking. The water temperature remains low year-round as the result of shading and cold water springs. It is expected that activities which change these habitat characteristics – increased sedimentation, scouring or sun exposure – would likely lead to a reduction or loss of individuals, and depending on the degree of impact, perhaps loss of the occurrence. Sedimentation or scouring could damage the thin, gelatinous thallus (body) of *Peltigera gowardii* by abrading it, leading to death of the organisms (USDA 2010a). Sedimentation could also cover the organisms, blocking their ability to photosynthesize (USDA 2010a).

The soil and watershed Best Management Practices (BMPs) define the standard practices which reduce the risks of adverse effects to those resources from project activities. There are BMPs which are designed to reduce the risk of the project causing soil erosion or sedimentation in the streams. The fire removed soil cover (vegetation, leaf litter and woody debris) over hundreds of acres in the three watersheds listed above. The risk of erosion and sedimentation entering the *Peltigera gowardii* in these streams is high as a result of the fire effects. The proposed project would produce some sediment because of normal project activities. The soil and watershed BMPs should reduce the amount of activity created sediment in these occurrences but might not alleviate it due to loss of soil cover combined with the logging activities. With the BMPs in place, the intensity of the adverse effects should be low to moderate. The duration could be long-term, depending on whether the sediment is washed away the following or near future winter.

Cumulative Effects - According to the Council on Environmental Quality (CEQ) NEPA regulations, "cumulative impact" is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions (40 CFR 1508.7).

The analysis area used to analyze the cumulative effects on Sensitive plants and their habitat is about 118,808 acres and includes all lands within the SERAL project area. The area provides an appropriate context for the reasonable determination of effects to species and habitat. Relevant cumulative effects from other projects that have or will treat areas within or adjacent to the action area were considered and included in the cumulative effects analysis (SERAL DEIS Appendix A). Existing conditions reflect the aggregate impact of all prior human actions and natural events that affected the environment and might contribute to cumulative effects. All activities listed and described in this appendix are not expected to affect all species considered in this document.

The combined effects of the SERAL project action alternatives with past, present, or foreseeable future projects, activities and incidents in the analysis area are not expected to result in adverse cumulative effects to Sensitive Plants. Individuals of some Sensitive Plant occurrences may be adversely affected by proposed project activities. However, these impacts are not expected to be so great in intensity or duration that any of these occurrences would be eliminated, when combined with other ongoing Forest activities.

Known occurrences of Sensitive Plants and any confirmed prior to project implementation would be protected by flagging and avoidance, or by timing project activities to reduce the number of individual Sensitive Plants affected, thereby reducing, minimizing, or alleviating adverse effects. None of the known occurrences of Sensitive Plants or any found prior to project implementation are expected to be impacted to the point of being eliminated. Any possible adverse effects from the SERAL project to these occurrences are expected to be temporary, limited to portions of occurrences, or limited in intensity.

The management requirements reduce the risk of loss of Sensitive Plant occurrences from the proposed project. Other ongoing Forest Service projects within the SERAL project, incorporated management requirements which also reduced the risk of loss of occurrences.

Some of the species expected or present are tolerant to some disturbance during a portion of their life cycle. For example, native plants on this landscape should be adapted to a normal low intensity fire cycle. The goal of the SERAL project is to restore the landscape to a more natural range of variation and to be more resilient to wildfires, or other disturbance events such as insect outbreaks or drought. Forest thinning, prescribed fire and control or eradication of invasive species should benefit all species and the proper functioning of their habitat in the longer term. The SEREAL project does not add cumulative effects to the departed condition of the existing landscape.

The analysis area is within several active cattle grazing allotments. There is an risk of these effects to sensitive plats and their habitat from active cattle grazing. Trampling and grazing by cattle can prevent the plants from setting seeds or spores. In the wetter areas, trampling can cause pocking of the soil which damages the habitat and directly kills the plants. Stream bank erosion from cattle accessing the stream causes sediment to enter the water which degrades the water quality for *Peltigera gowardii* and can cause loss of individuals or entire occurrences, depending on the degree that the water quality is degraded. Management requirements in the Term Grazing Permits and BMPs are developed to mitigate grazing impacts.

<u>Alternative 2 – No Action</u>

Direct and Indirect Effects

There would be no direct effects to Sensitive Plants from this alternative.

Indirect effects might occur in the form of a wildfire which would burn at a high intensity, thereby killing the sensitive plants and altering suitable habitat. Mature forest stands and other vegetation community types would continue to grow and close in without management possibly impacting species intolerant to shade and competition. Disturbance oriented species may not experience a disturbance event that could benefit populations. Occurrences of invasive species would continue to expand resulting in competition and displacement of some sensitive species populations.

Cumulative Effects

There would be no cumulative effects with the No Action alternative. Other projects and activities occurring in the project area would continue and possible effects from those actions may continue to impact sensitive species present as described in the cumulative effects for the action alternatives.

Summary of Determinations

A determination of effects is made with the assumption that the project would be implemented as described in the SERAL Draft EIS. Deviation from the description, including not protecting sensitive plants from potential impacts of implementation, could change the determination.

Surveys for the Sensitive Plants have been conducted in portions of the SERAL project. However, those surveys have been conducted over the past 20 plus years and most of those surveys occurred prior to the most recent sensitive species list revision in 2013. The past surveys were species-specific, they were focused on the species on the Sensitive List at the time of surveys. The surveys did not include complete accounting of all botanical species encountered. Most areas had not been surveyed for all the current Sensitive species which might occur there.

There are known occurrences of *Allium tribracteatum, Clarkia biloba ssp. australis, Cypripedium montanum, Erythronium tuolumnense, Horkelia parryi, Iris hartwegii ssp. columbiana, Lomatium stebbinsii, and Mimulus pulchellus.* within the analysis area. There is additional suitable habitat for these species in the project area that may have never been surveyed.

There is suitable habitat for the additional species *Allium jepsonii, Arctostaphylos nissenana, Balsamorhiza macrolepis, Boechera tularensis, Botrychium ascendens, Botrychium crenulatum, Botrychium lineare, Botrychium lunaria, Botrychium minganense, Botrychium montanum, Botrychium pedunculosum, Botrychium pinnatum, Botrychium tunux, Botrychium yaaxudakeit, Bruchia bolanderi, Calochortus clavatus, Cinna bolanderi, Clarkia australis, Collybia racemosa, Eriastrum tracyi, Eriogonum luteolum var. saltuarium, Fissidens aphelotaxifolius, Helodium blandowii, Hulsea brevifolia, Lewisia kelloggii ssp. hutchinsonii, Lewisia kelloggii ssp. kelloggii, Meesia uliginosa, Mielichhoferia elongata, Mielichhoferia shevockii, Peltigera gowardii, Pinus albicaulis and Tauschia howellii.*

Where sensitive plants are present, the proposed project activities could result in adverse effects. There might be instances where annual species, *Clarkia australis, Clarkia biloba* ssp. *australis* and *Mimulus pulchellus* might be damaged or killed. However, these impacts would not cause the loss of any

occurrences of these species and the activities should benefit the occurrences at least for the short term.

Occurrences of sensitive plants in roadsides and where hazard trees may need removal could be impacted to abate a hazard to the public or workers. The smallest possible portion of an occurrence would be impacted. No occurrences are expected to be eliminated in this situation.

Activities in the action alternative might cause indirect impacts to occurrences of *Allium tribracteatum, Lomatium stebbinsii, Lewisia kelloggii* ssp. *hutchisonii, Lewisia kelloggii* ssp. *kelloggii* and *Mimulus pulchellus.* Timber removal near the lava cap habitats of these species might open motorized vehicle access, creating erosion problems and direct killing of plants. New occurrences of invasive species may be introduced, degrading the habitat and possibly causing the loss of Sensitive Plants.

Determinations

The following 10 sensitive plants species are not within the SERAL project geographic or elevational range of the species. There would be No Effect to the species resulting from the SERAL project activities.

Allium yosemitense, *Boechera evadens*, *Clarkia lingulata*, *Draba asterophora* var. *asterophora*, *Draba asterophora* var. *macrocarpa*, *Eriophyllum congdonii*, *Eriophyllum nubigenum*, *Erythronium taylorii*, *Lewisia congdonii*, and *Mimulus filicaulis*.

There are no known occurrences of the following species within the SERAL project are. There is suitable habitat that has not been surveyed. The management requirements for the action alternatives would reduce or mitigate adverse effects from the project activities should they be found.

The SERAL project as described in the Draft EIS, may affect individuals, but is not likely to result in a trend toward Federal listing or loss of species viability for:

Allium jepsonii, *Arctostaphylos nissenana*, *Balsamorhiza macrolepi*s, *Boechera tularensis, Botrychium ascendens*, *Botrychium crenulatum*, Botrychium lineare, *Botrychium lunaria*, *Botrychium minganense*, *Botrychium montanum*, *Botrychium pedunculosum*, *Botrychium pinnatum*, *Botrychium tunux*, *Botrychium yaaxudakeit*, *Bruchia bolanderi*, *Calochortus clavatus*, *Cinna bolanderi*, *Collybia racemosa*, *Eriastrum tracyi, Eriogonum luteolum var. saltuarium*, *Fissidens aphelotaxifolius*, *Helodium blandowii*, *Hulsea brevifolia*, *Lewisia kelloggii ssp. hutchinsonii*, *Lewisia kelloggii ssp. kelloggii*, *Meesia uliginosa*, *Mielichhoferia elongata*, *Mielichhoferia shevockii*, *Peltigera gowardii*, *Pinus albicaulis* and *Tauschia howellii.*

Allium tribracteatum

Approximately 80 percent of the known occurrences on the Forest are within the project area totaling over 400 acres, including the largest known population. The management requirements for the action alternatives would reduce or alleviate adverse effects from all project activities to occurrences of *Allium tribracteatum* where they occur within the project area.

The SERAL project as described in the Draft EIS, may affect individuals, but is not likely to result in a trend toward Federal listing or loss of species viability for the species *Allium tribracteatum.*

Clarkia biloba ssp. *australis*

There are four known occurrences in the project area totaling 1.75 acres, approximately 4% of known Forest occurrences. There is suitable habitat in units which has not been surveyed. The management requirements would reduce, minimize or alleviate adverse effects from all project activities to occurrences of *Clarkia biloba* ssp. *australis*.

The SERAL project as described in the Draft EIS, may affect individuals, but is not likely to result in a trend toward Federal listing or loss of species viability for the species *Clarkia biloba* ssp. *australis.*

Cypripedium montanum

There is only one known occurrences of *Cypripedium montanum* within the SERAL project area. There is suitable habitat that has not been surveyed. The management requirements for the action alternatives would reduce or alleviate adverse effects from all project activities to occurrences of *Cypripedium montanum*.

The SERAL project as described in the Draft EIS, may affect individuals, but is not likely to result in a trend toward Federal listing or loss of species viability for the species *Cypripedium montanum.*

Erythronium tuolumnense

Approximately 80 percent of the known occurrences on the Forest are within the project area totaling over 790 acres. The management requirements for the action alternatives would reduce or alleviate adverse effects from all project activities to occurrences of *Erythronium tuolumnense*.

The SERAL project as described in the Draft EIS, may affect individuals, but is not likely to result in a trend toward Federal listing or loss of species viability for the species *Erythronium tuolumnense.*

Horkelia parryi

There is one known occurrences of *Horkelia parryi* within the SERAL project area, however there is suitable habitat which has not been surveyed. The management requirements for the action alternatives would reduce or alleviate adverse effects from all project activities to the occurrence of *Horkelia parryi*, or any new occurrences should they be found there during project surveys.

The SERAL project as described in the Draft EIS, may affect individuals, but is not likely to result in a trend toward Federal listing or loss of species viability for the species *Horkelia parryi.*

Iris hartwegii ssp. columbiana

There are nine known occurrences on the Forest. All of them are located within the project area totaling 42 acres. There is additional unsurveyed suitable habitat in the project area. The management requirements for the action alternatives would reduce or alleviate adverse effects from all project activities to the occurrence of *Iris hartwegii ssp. columbiana*, or any new occurrences should they be found there during project surveys.

The SERAL project as described in the Draft EIS, may affect individuals, but is not likely to result in a trend toward Federal listing or loss of species viability for the species *Iris hartwegii ssp. Columbiana.*

Lomatium stebbinsii

Approximately one third of the known occurrences on the Forest are in the project area totaling nearly 500 acres. There is suitable habitat which has not been surveyed. The management requirements for the action alternatives would reduce or alleviate adverse effects from all project activities to the occurrence of *Lomatium stebbinsii*.

The SERAL project as described in the Draft EIS, may affect individuals, but is not likely to result in a trend toward Federal listing or loss of species viability for the species *Lomatium stebbinsii.*

Mimulus pulchellus

All 19 of the occurrences from the Mi-Wok district are within or directly adjacent to the project area; 29 acres or approximately 12% of the known occurrences on the Forest. There remains unsurveyed suitable habitat within the project. The management requirements for the action alternatives would reduce, minimize or alleviate adverse effects from all project activities to occurrences of *Mimulus pulchellus.*

The SERAL project as described in the Draft EIS, may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the species *Mimulus pulchellus.*

Pinus albicaulis

There are no known occurrences of *Pinus albicaulis* within the SERAL project area. The species is proposed Federally threatened. The project is within the range of the species. Based on local knowledge it is very unlikely there will be any occurrences discovered in the project through surveys. The management requirements for the action alternatives would eliminate effects from project activites.

The SERAL project as described in the Draft EIS, would have no effect on the species *Pinus albicaulis.*

Table 4 - Summary of Determinations

Sensitive Plant Species	Status	Determination*
Allium jepsonii	Sensitive	May Affect

Sensitive Plant Species	Status	Determination*
Allium tribracteatum	Sensitive	May Affect
Allium yosemitense	Sensitive	No Effect
Arctostaphylos nissenana	Sensitive	May Affect
Balsamorhiza macrolepis	Sensitive	May Affect
Boechera evadens	Sensitive	No Effect
Boechera tularensis	Sensitive	May Affect
Botrychium ascendens	Sensitive	May Affect
Botrychium crenulatum	Sensitive	May Affect
Botrychium lineare	Sensitive	May Affect
Botrychium lunaria	Sensitive	May Affect
Botrychium minganense	Sensitive	May Affect
Botrychium montanum	Sensitive	May Affect
Botrychium pedunculosum	Sensitive	May Affect
Botrychium pinnatum	Sensitive	May Affect
Botrychium tunux	Sensitive	May Affect
*Botrychium yaaxudakei*t	Sensitive	May Affect
Bruchia bolanderi	Sensitive	May Affect
Calochortus clavatus	Sensitive	May Affect
Cinna bolanderi	Sensitive	May Affect
Clarkia australis	Sensitive	May Affect
Clarkia biloba ssp. *australis*	Sensitive	May Affect
Clarkia lingulata	Sensitive	No Effect
Cypripedium montanum	Sensitive	May Affect
Dendrocollybia racemosa	Sensitive	May Affect
Draba asterophora var. asterophora	Sensitive	No Effect
Draba asterophora var. macrocarpa	Sensitive	No Effect
Eriastrum tracyi	Sensitive	May Affect
Eriogonum luteolum var. *saltuarium*	Sensitive	May Affect
Eriophyllum congdonii	Sensitive	No Effect
Eriophyllum nubigenum	Sensitive	No Effect
Erythronium taylorii	Sensitive	No Effect
Erythronium tuolumnense	Sensitive	May Affect
Fissidens aphelotaxifolius	Sensitive	May Affect
Helodium blandowii	Sensitive	May Affect
Horkelia parryi	Sensitive	May Affect
Hulsea brevifolia	Sensitive	May Affect
Iris hartwegii ssp. columbiana	Sensitive	May Affect
Lewisia congdonii	Sensitive	No Effect
Lewisia kelloggii ssp. *hutchisonii*	Sensitive	May Affect
Lewisia kelloggii ssp. *kelloggii*	Sensitive	May Affect
Lomatium stebbinsii	Sensitive	May Affect
Meesia uliginosa	Sensitive	May Affect
Mielichhoferia elongata	Sensitive	May Affect
Mielichhoferia shevockii	Sensitive	May Affect
Mimulus filicaulis	Sensitive	No Effect
Mimulus pulchellus	Sensitive	May Affect
Peltigera gowardii	Sensitive	May Affect
Pinus albicaulis	Proposed Threatened	No Effect

Sensitive Plant Species	Status	Determination*
Tauschia howellii	Sensitive	May Affect

*May Affect = May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability

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